DOCUMENT RESUME

ED 169 341 CE 020 526

AUTHOR Jones, Phillip
TITLE T & I--Electricity. Power. Kit No. 52. Instructor's Manual [and] Student Learning Activity Guide.
INSTITUTION Clemson Univ., S.C. Vocational Education Media Center.; South Carolina State Dept. of Education, Columbia. Office of Vocational Education.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
PUB DATE 78
GRANT SC-5058-76-I-211-0330
NOTE 39p.; For related documents see CE 020 474-566
AVAILABLE FROM Vocational Education Media Center, 10 Tillman Hall, Clemson University, Clemson, South Carolina 29631 (complete set of modules, 14 filmstrips and cassettes, $260.00; set of 87 student modules, $92.50)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Behavioral Objectives; *Electricity; Instructional Materials; *Learning Activities; *Learning Modules; Occupational Clusters; *Occupational Information; Prevocational Education; *Trade and Industrial Education

ABSTRACT

An instructor's manual and student activity guide on electrical power are provided in this set of prevocational education materials which focuses on the vocational area of trade and industry. (This set of materials is one of ninety-two prevocational education sets arranged around a cluster of seven vocational offerings: agriculture, home economics, distributive education, health occupations, world of work, trade and industry, and office occupations.) The instructor's guide is organized into the following elements: title of activity, duration of activity (five to seven periods), activity goals, eleven instructional objectives, related vocational clusters, and activity implementation (description, materials needed, safety considerations, teacher preparation prior to class, during the class, follow-up activities, answer key to student check point activities, and masters for duplication [e.g., wiring diagrams]). The student activity guide provides step-by-step instructions (narrative and illustrations) for completing each instructional objective (e.g., assemble an electrical plug, wire a circuit). At the end of each set of instructions is a student check point (evaluation activity). Occupational descriptions for an electrician supervisor and an electrician helper conclude the document. (JH)

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ED169341

T & I – ELECTRICITY, POWER

Kit No. 52

INSTRUCTOR'S MANUAL

Prepared by

Phillip Jones
Southside High School
Greenville, South Carolina 29609

State Department of Education
Office of Vocational Education
Prevocational Education
Columbia, South Carolina 29201

In Cooperation With

Vocational Education Media Center
Clemson University
Clemson, South Carolina 29631

1978

CE 020 526

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TITLE OF ACTIVITY

Kit No. 52, T & I – Electricity, Power

DURATION

Main Activity: 3 – 4 periods
Follow-up Activity: 2 – 3 periods

GOALS

The student will understand some basic electrical operations and terms.

Students will learn about care and use of some simple hand tools.

INSTRUCTIONAL OBJECTIVES

Given appropriate instruction and pictures of tools, the student will identify the tools needed in this activity.

Given appropriate instruction, the student will identify five basic electrical terms.

Given appropriate instruction, the student will identify electrical symbols.

Given appropriate equipment and using diagram A, the student will wire the circuit.

Given appropriate instructions and equipment, the student will prepare the module for the power experiment.

Given appropriate instructions and equipment, the student will record light density readings using various bulbs and voltage to identify effects of resistors and voltage on a circuit.

Given appropriate instructions, the student will clean up and return all tools and equipment.

Given appropriate equipment and using diagram B, the student will wire the circuit.

Given appropriate instructions and equipment, the student will prepare the module for the power experiment.

Given appropriate instructions and equipment, the student will operate the siren and record the decibel levels at various voltages.

Given appropriate instructions, the student will clean up and return all tools and equipment.

VOCATIONAL CLUSTERS

Office Occupations, Agriculture

ACTIVITY IMPLEMENTATION

A. Description

This activity can be conducted at any time during the year. It is suggested that students work in groups of 2 – 4 in the completion of this activity.

Students will wire two electrical circuits and analyze the results of various amounts of voltage applied to each system.

B. Safety

Electricity is dangerous. You must observe your students closely all the time they are wiring the circuit. Never let anyone work on the circuit while the transformer is operating. Inspect all connections, checking to see that wires touch only contact screws and not each other.

C. Materials

1. Audio Visual Equipment:

   None

2. Technical Equipment:

   6 transformers
   3 porcelain sockets
   3 sirens
   6 single-pole switches
   6 switch boxes
   6 common screwdrivers
   6 Phillips screwdrivers
   6 wire strippers
   6 needle-nose pliers
   25 metric rulers
   1 light meter
   1 sound meter

3. Expendable Materials:

   50-foot roll of white No. 12 wire
   50-foot roll of black No. 12 wire
   3 – 40-watt light bulbs
   3 – 60-watt light bulbs
   3 – 100-watt light bulbs

D. Preparation Prior to Class

Read through the Student Activity Guide, especially if this is the first time you have used an activity of this type. Duplicate enough masters, VIEW Fact Sheets, Check Sheets and diagrams for all your students. Have enough work area in your room to locate all six mock-ups so that 2 – 4 students could work comfortably.

E. During Class Session

Explain to your students how important safety is when working with electricity. Review the precautions in the Student Activity Guide and the checkpoints that require your observation and inspection.

Divide your class into small groups to work on the mock-ups. After doing objectives I – III, the students who are going to work on the siren will go to Instructional Objective IX.

F. Follow-up Activities

1. VIEW Fact Sheet
2. Discuss the data results on the check sheet.
   Sample questions:
   a. Why did additional voltage increase light?
   b. Why did additional voltage increase sound?
   c. Would it cost more to operate a 40-watt bulb than a 60- or 100-watt bulb?
   d. Did you like working with electrical circuits and why? or why not?

ANSWER KEY

Checkpoint No. 1

1. Common screwdriver
2. Phillips screwdriver
3. Wire strippers
4. Needle-nose pliers

Checkpoint No. 2

D Electrons
E Electricity
A Resistor
B Amperage
C Voltage

Checkpoint No. 3

1. transformer
2. switch
3. lamp
4. bell

MASTERS FOR DUPLICATION

1. VIEW Fact Sheet
2. Check Sheet
3. Diagram A
4. Diagram B

VIEW FACT SHEET

NAME _____ CLASS _____ OCCUPATION _____

A. List the advantages (good points) of this occupation (job).

B. List the disadvantages (bad points) of this occupation (job).

C. List three things you should know to do this occupation (job).
1.
2.
3.

D. What type of education should you get to be prepared (do) for this occupation (job)?

E. What courses must you take to go into this occupation (job)?

F. What do you think your future in this occupation (job) will be?

G. What wage can you expect in this occupation (job)?

H. What are the working hours of this occupation (job)?

I. To learn more about this occupation (job), write to:

J. Using a scale of 1 to 5, circle the number that measures your interest in this occupation (job) as a possible career.

I don't like it. ← 1 2 3 4 5 → I like it.

CHECK SHEET

Checkpoint No. 1

1. _____
2. _____
3. _____
4. _____

Checkpoint No. 2

_____ Electrons

_____ Electricity

_____ Resistor

_____ Amperage

_____ Voltage

A. is any object (device) which slows the path of the electrons.

B. are the amount of electrons that travel past a given point.

C. is the pressure at which electrons travel.

D. are small units of electrical energy.

E. form of power we are all familiar with because we use it in our everyday activities.

Checkpoint No. 3

1. _____
2. _____
3. _____
4. _____

Check Sheet (cont'd.)

Checkpoint No. 4

Instructor's Initial _____
I have inspected this circuit.

Checkpoint No. 6

Candlepower Readings

VOLTAGE	40	80	110
40 w			
60 w			
100 w			

Checkpoint No. 8

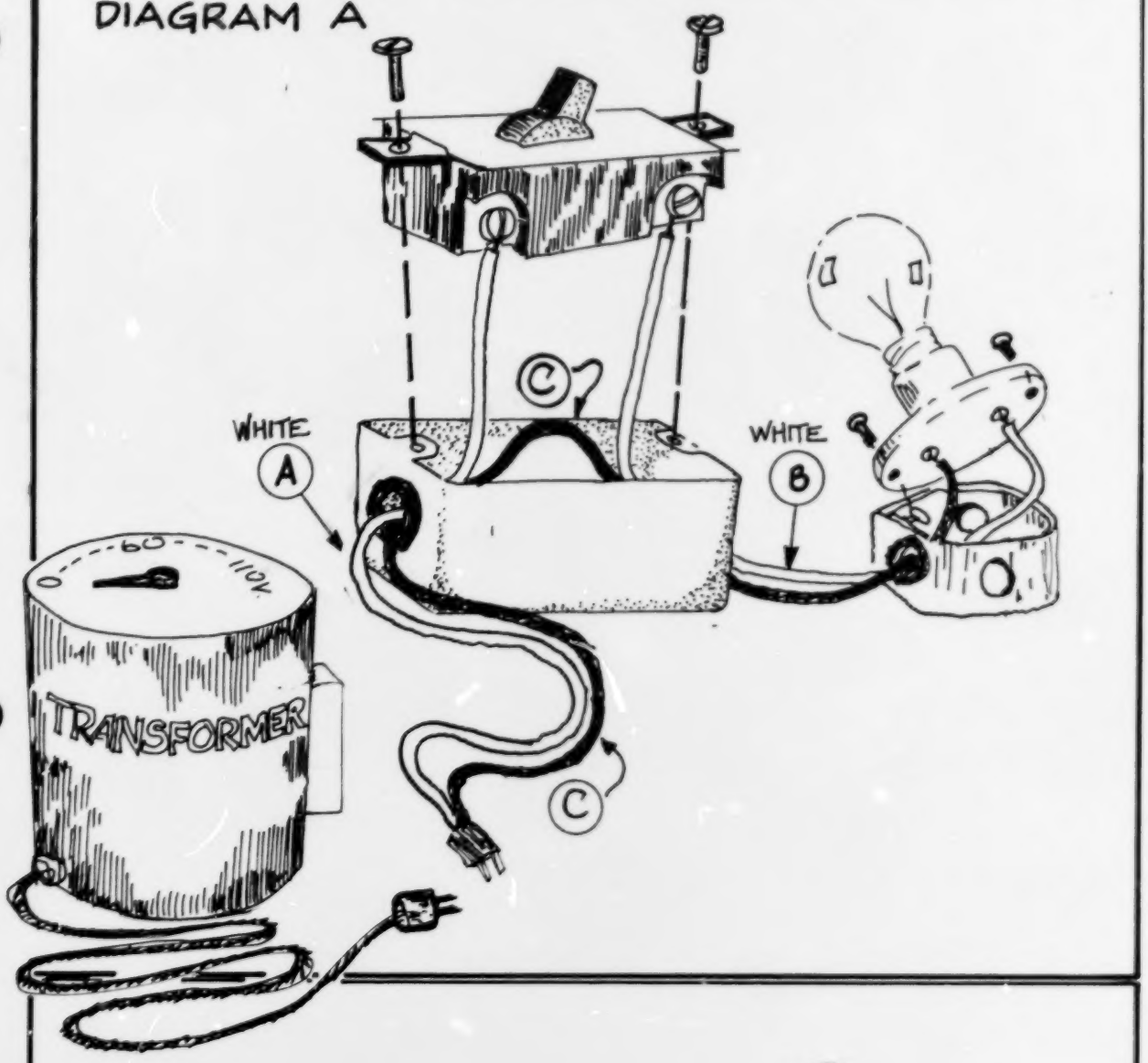
Instructor's initials _____
I have inspected this circuit.

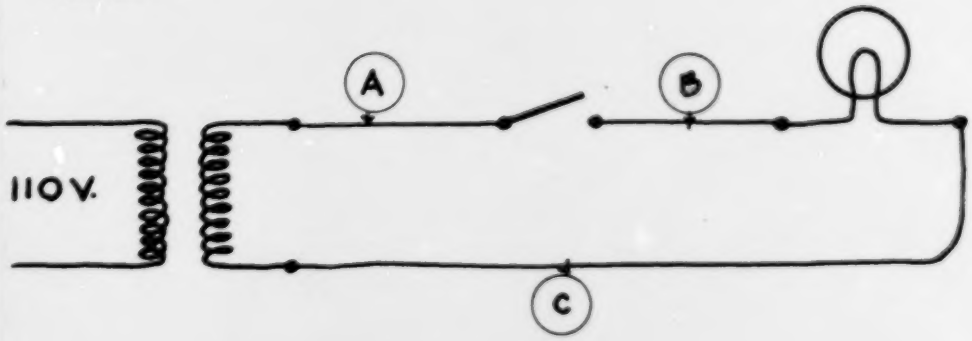
Checkpoint No. 11

VOLTAGE	40	80	110
Decibels of siren			

8

DIAGRAM A





WIRING DIAGRAM A

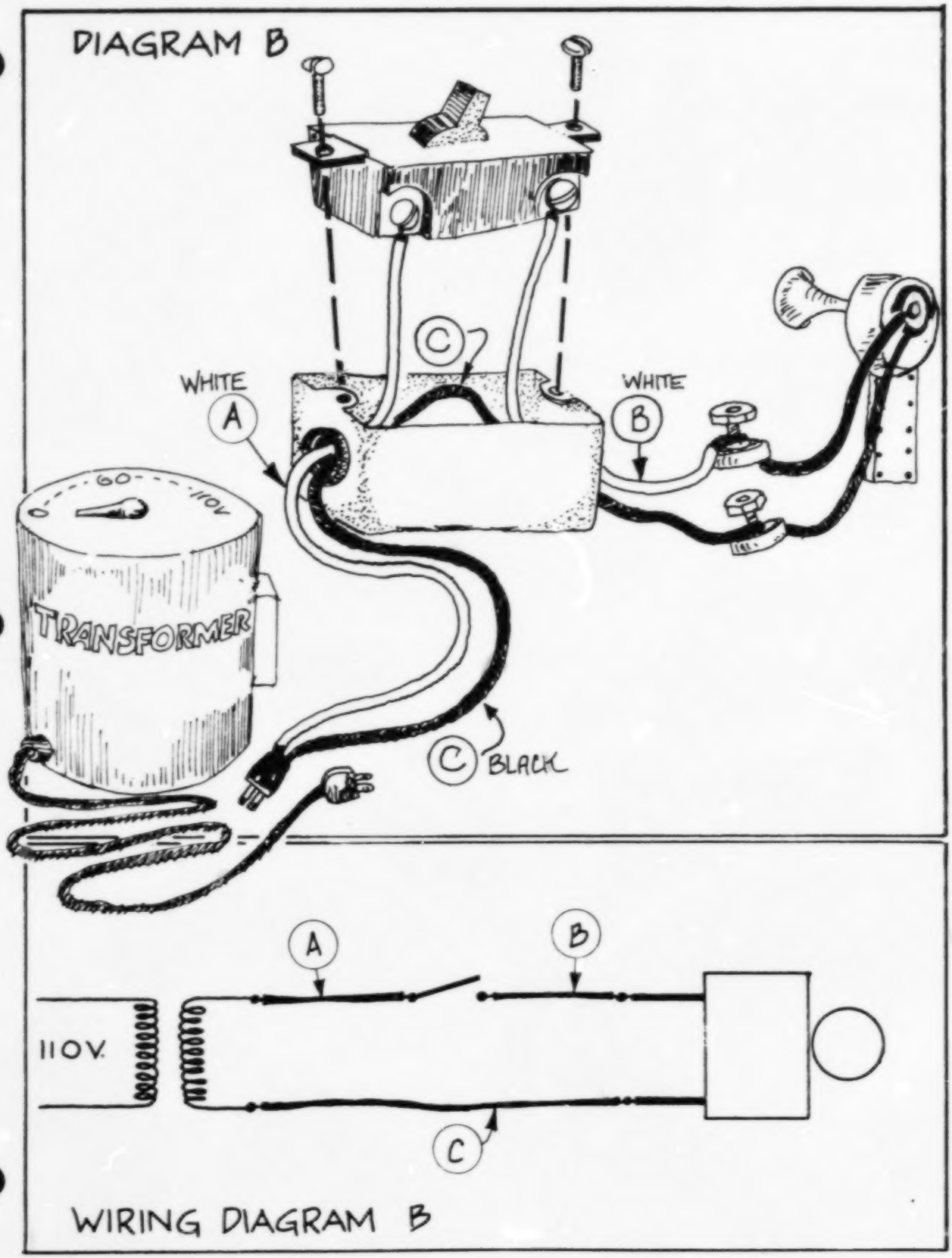


DIAGRAM B
WHITE
A
C
WHITE
B
60
110V
TRANSFORMER
C
BLACK
A
B
110V.
C
WIRING DIAGRAM B

T & I – ELECTRICITY, POWER

Kit No. 52

STUDENT

LEARNING ACTIVITY GUIDE

Prepared by

Phillip Jones
Southside High School
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INTRODUCTION

This activity is designed to introduce you to basic electrical terms, tools, and operations. You will learn about wiring symbols and diagrams. In this activity, you will wire two electrical circuits and experiment with different levels of power. Your results may vary slightly from those of other class members, but your general terms and operations will be the same.

GOALS

The student will understand some basic electrical operations and terms. Students will learn about care and use of some simple hand tools.

DIRECTIONS

Electricity is colorless, odorless, and noiseless. Therefore it is very dangerous as you can't hear, see, or smell it. Please be extra cautious whenever you are working with or around any electrical system.

MATERIALS

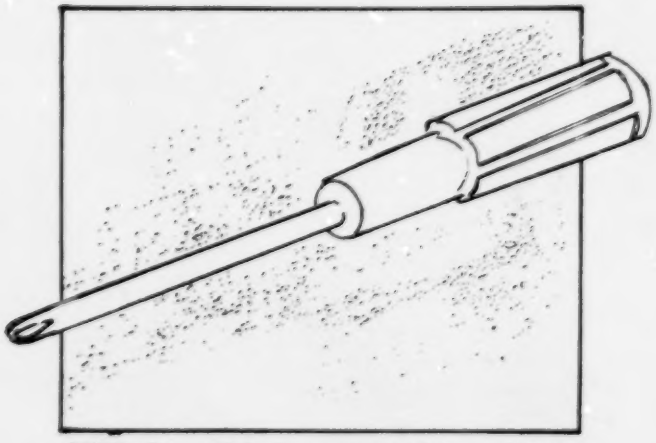
All materials needed for this activity will be provided by the instructor. Descriptions of all tools will be found in the Objectives to follow.

PROGRAMMED TEXT

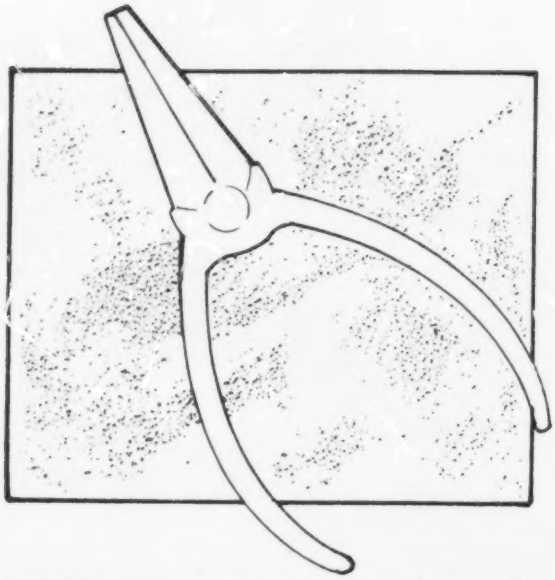
Instructional Objective 1

Given appropriate instruction and pictures of tools, the student will identify the tools needed in this activity.

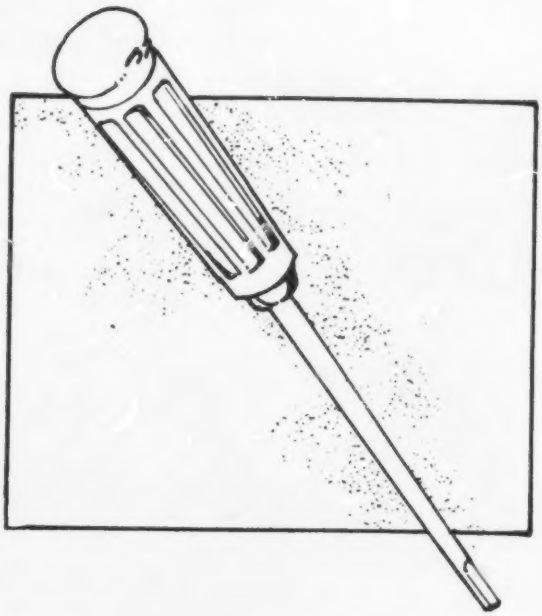
STEP 1 – This is a common blade screwdriver. It is used to operate screws with straight grooved heads.

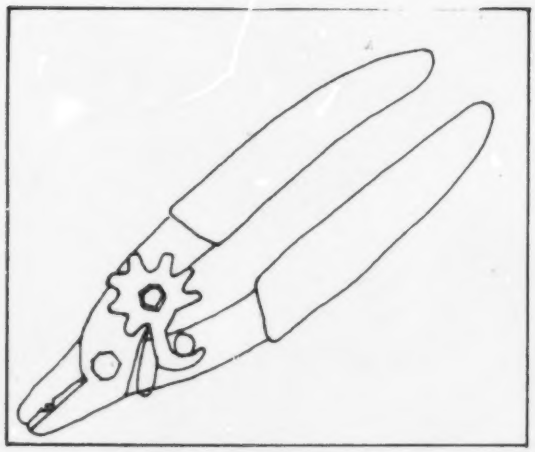


STEP 2 – This is a crosspoint or Phillips screwdriver. It is used to loosen or tighten screws with cross grooved heads.

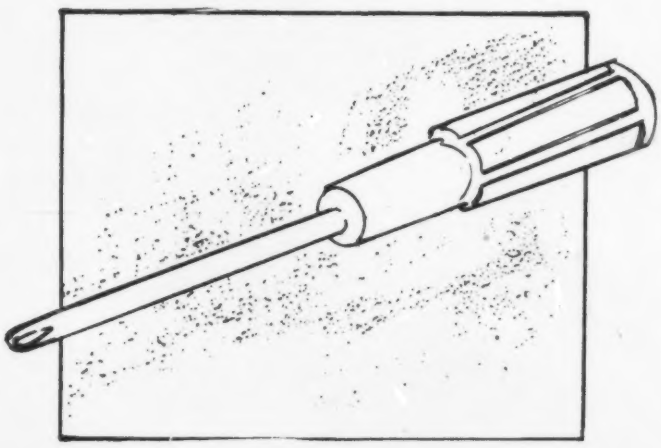


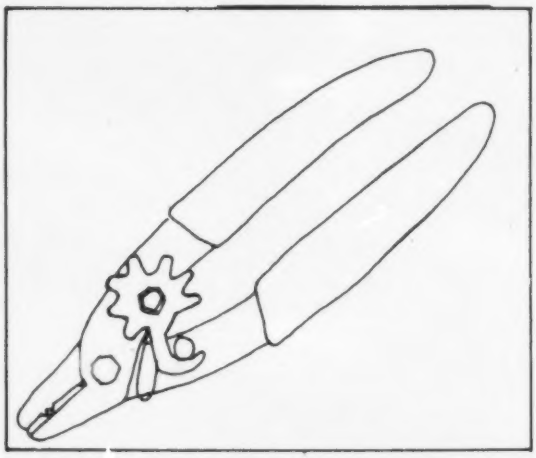
STEP 3 – Needle-nose pliers are used for both cutting and forming operations with wire.





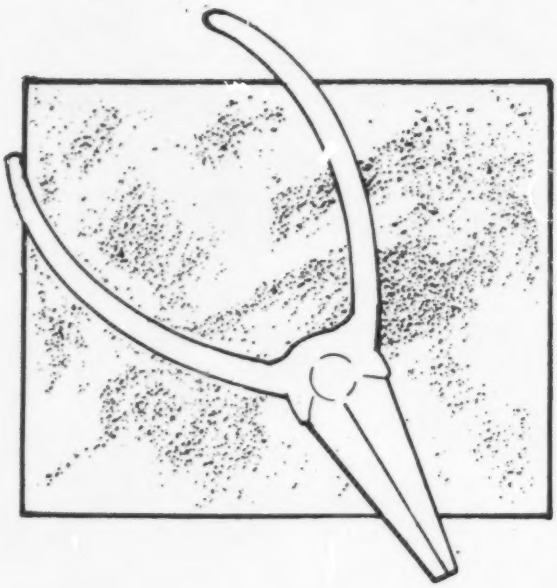
STEP 4 – Wire strippers are used to remove insulation from wire.





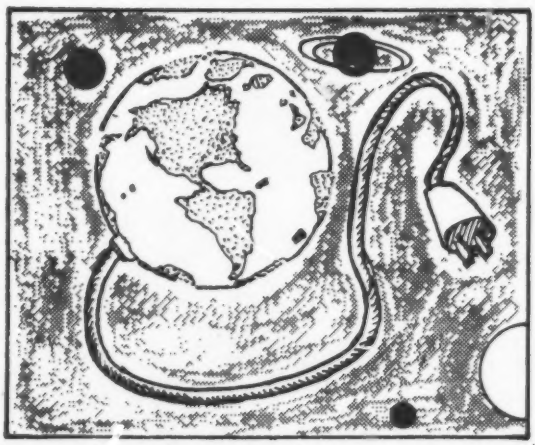
Check Point

Identify the following tools. Write your answers on the Check Sheet for Checkpoint No. 1.

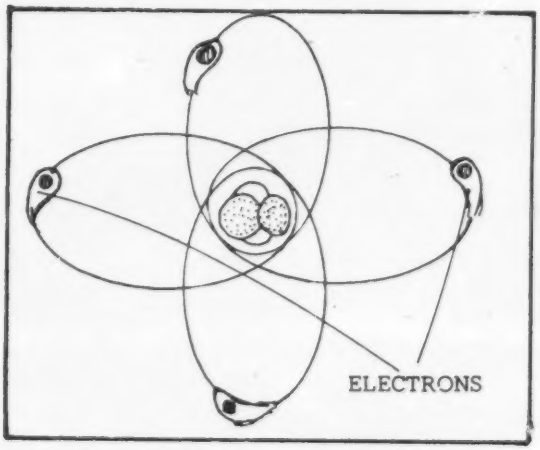


Instructional Objective 11

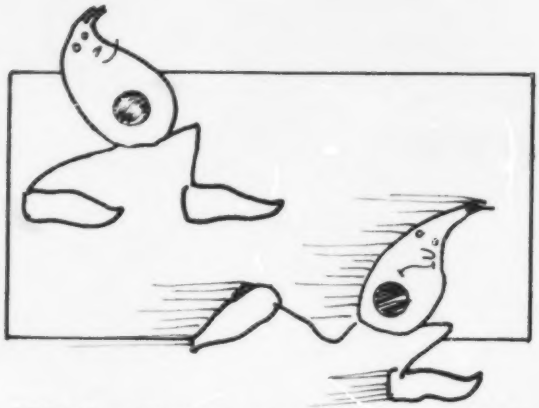
Given appropriate instruction, the student will identify five basic electrical terms.



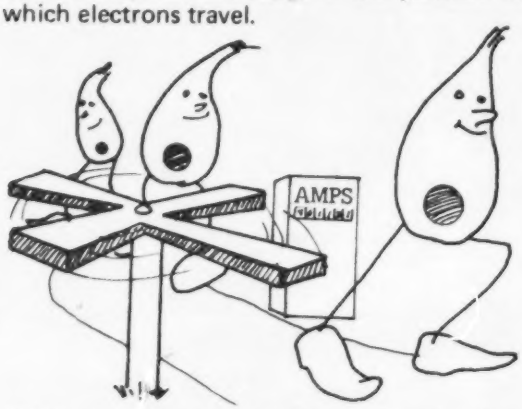
STEP 1 -- Electricity is a form of power we are all familiar with because we use it in our everyday activities.



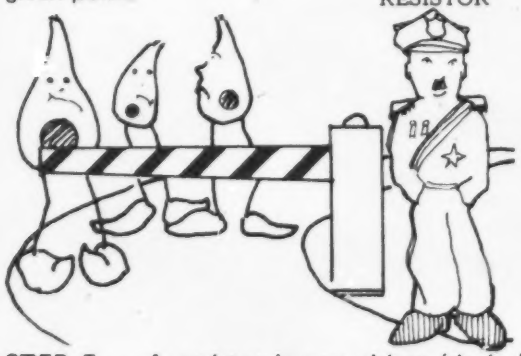
STEP 2 – Part of this electrical force is an electron. Electrons are small units of electrical energy.



STEP 3 – Electrons travel either slow or fast. The speed depends on the amount of voltage (volts) they have. Voltage is the pressure at which electrons travel.



STEP 4 – There is another term related to electrons. It is called amperage (Amps). Amps are the amount of electrons that travel past a given point.



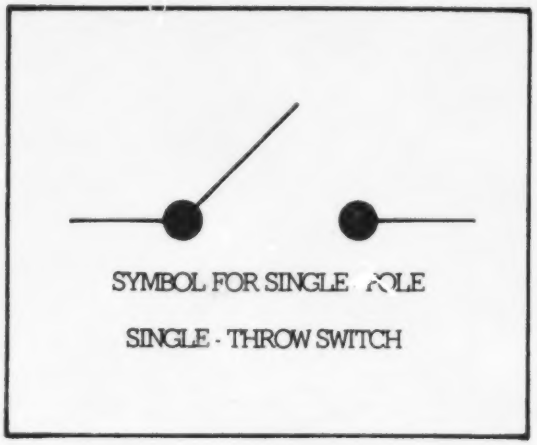
STEP 5 – A resistor is any object (device) which slows the path of the electrons. Examples of resistance include: light bulb, TV set, hair dryer, toaster, table saw, welder, or any item that uses electricity.

Check Point

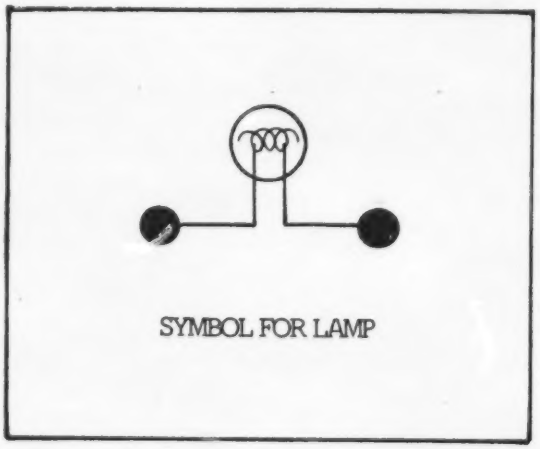
Obtain the Check Sheet and fill in the matching column for Checkpoint 2.

Instructional Objective III

Given appropriate instructions, the student will identify four electrical symbols.



STEP 1 – This is the symbol of a single-pole, single-throw switch. A switch is used to complete an electric circuit in order to operate a device which is wired to the circuit.



STEP 2 – This is the symbol of a lamp. When various amounts of electricity are applied to this device, various intensities of light will be given off.

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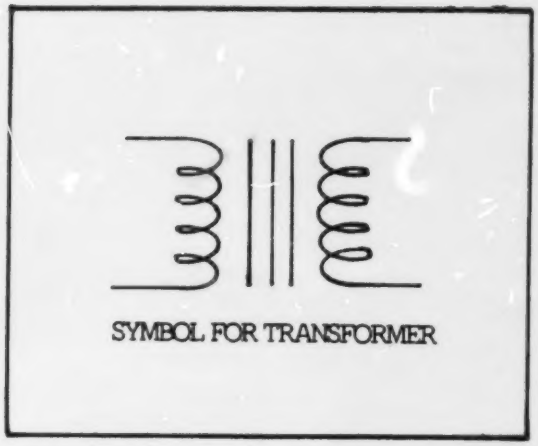
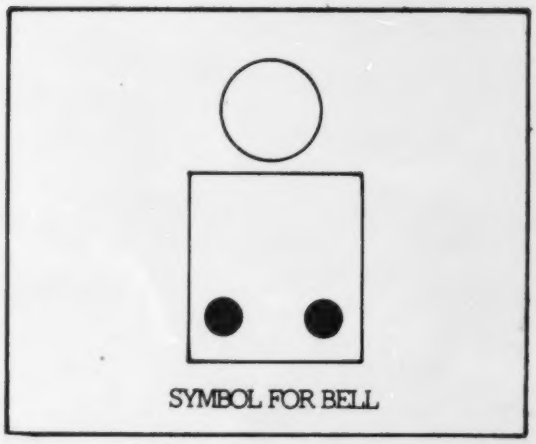


SYMBOL FOR TRANSFORMER

STEP 3 – This is the symbol for a transformer. A transformer can be plugged into a wall socket which delivers 110 volts. The transformer, operated by a series of coils, will vary this voltage to a device by a simple, hand-controlled lever.

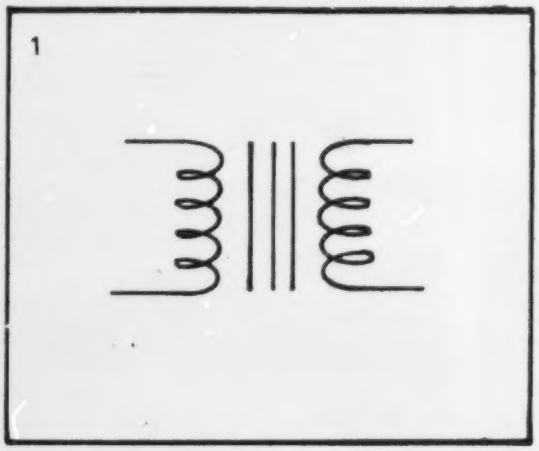


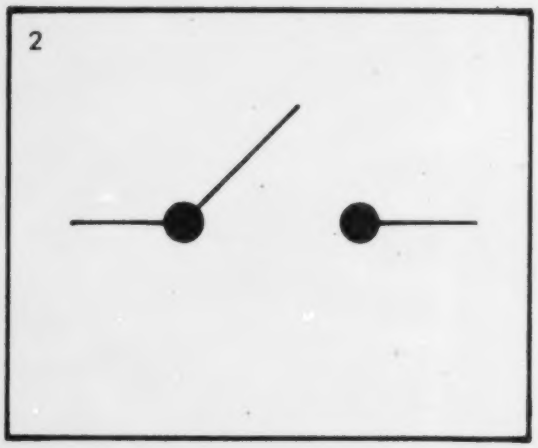
SYMBOL FOR BELL

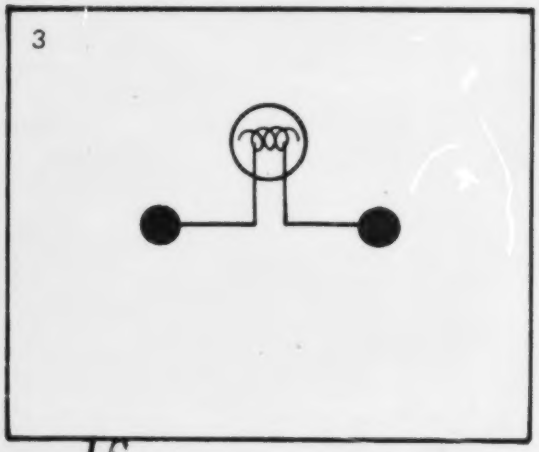
STEP 4 – This is the symbol for a bell. The bell will operate in a circuit and give sound when in operation. By changing the amount of voltage to this device, the amount of sound (decibels) will change.

Check Point

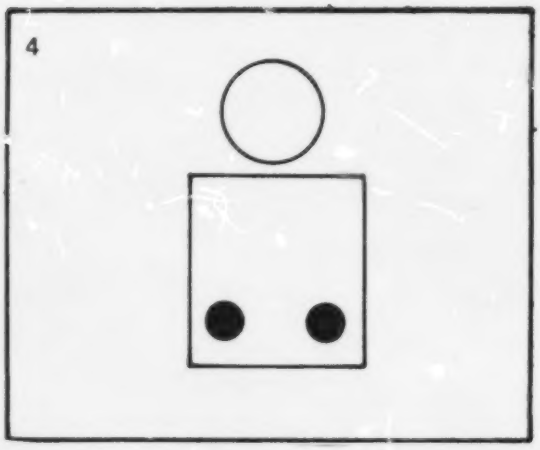
Using your check sheet, identify the components of each circuit in the spaces provided for checkpoint 3.





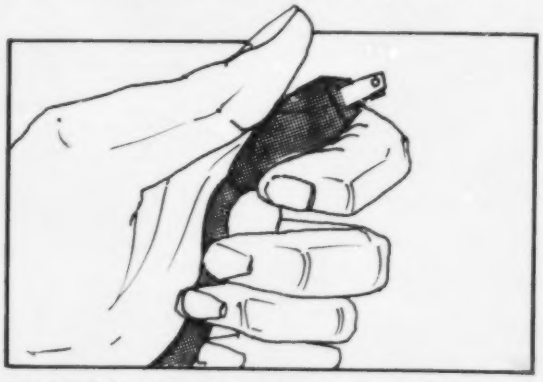


16

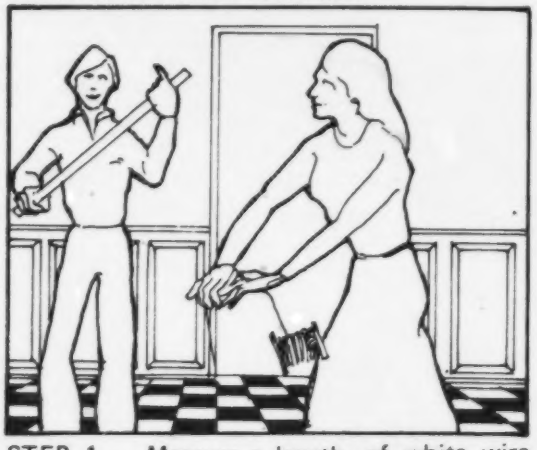


Instructional Objective IV

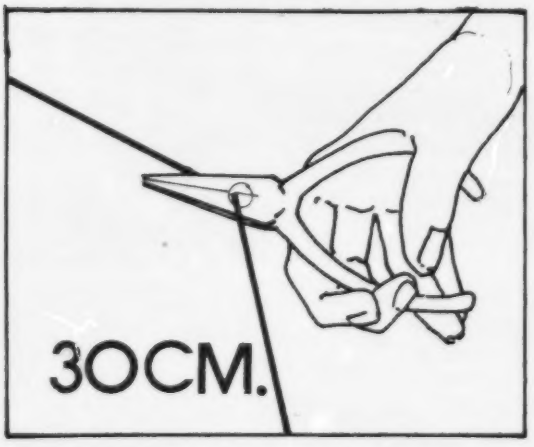
Given appropriate equipment and using diagram A, the student will wire the circuit.



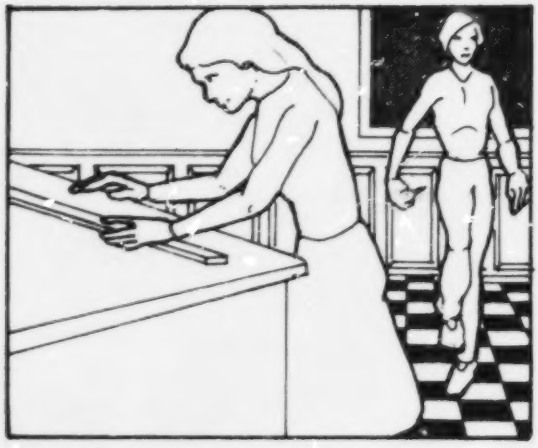
SAFETY NOTE: Always unplug any electrical item when not in use.



STEP 1 – Measure a length of white wire 30 cm long.

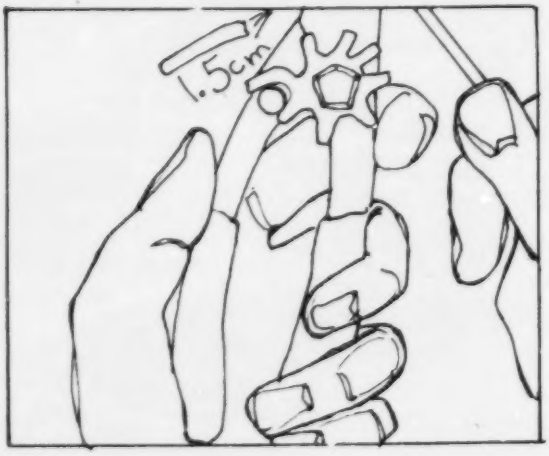


STEP 2 – Using the needle-nose pliers, cut-off this length of white wire.



STEP 3 – Measure 1.5 cm on each end of the wire.

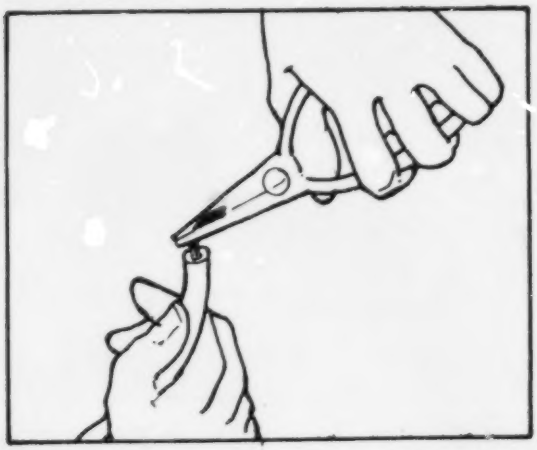
STEP 4 – Using the wire strippers, adjust the hole number setting to 12, grasp the insulation on the 1.5 mark.



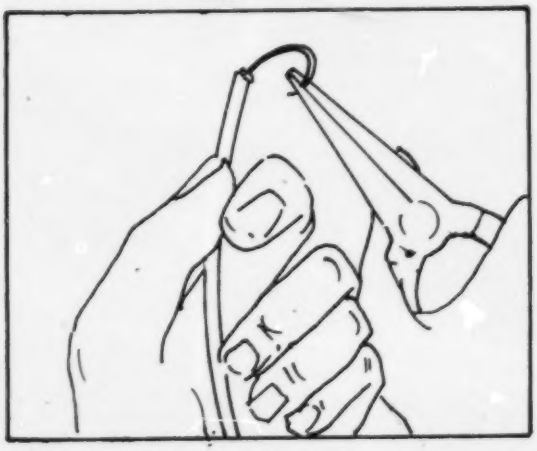
STEP 5 – Squeeze and pull off 1.5 cm of insulation.

REPEAT

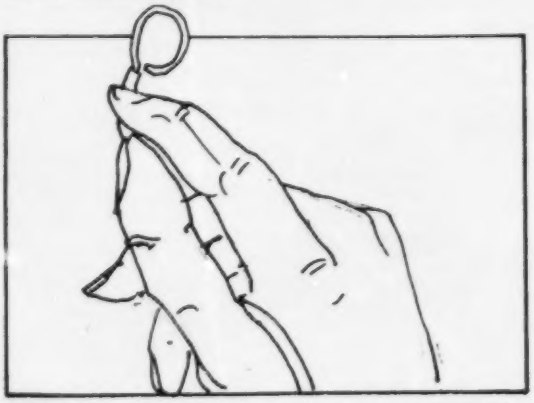
STEP 6 – Repeat this operation for the other end of the wire.



STEP 7 – Using the needle-nose pliers, grasp the end of the exposed wire.



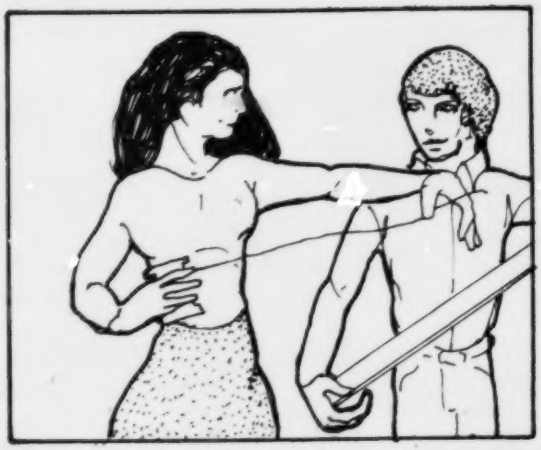
STEP 8 – Twist the wire into a circle around the end of the pliers.



STEP 9 – Remove the pliers and observe the shape of the wire. Does it look like the illustration above?

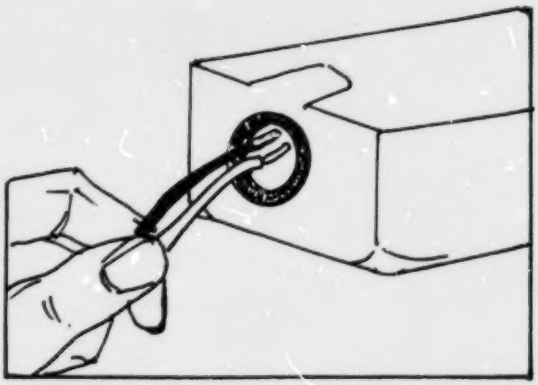
CONTINUE

STEP 10 – If it does resemble step 9, proceed with steps 7, 8, and 9 for the other end of the wire.

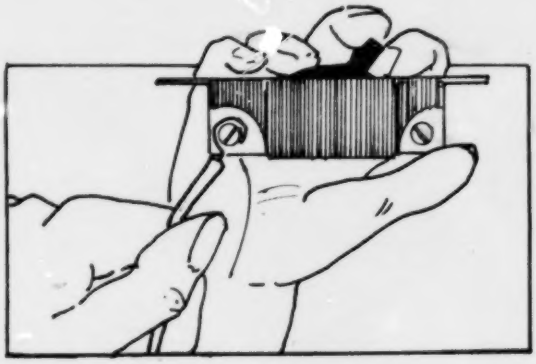


STEP 11 – Measure, mark, cut and strip a piece of black wire 70 cm long. Follow steps 1–10 for the proper procedure.

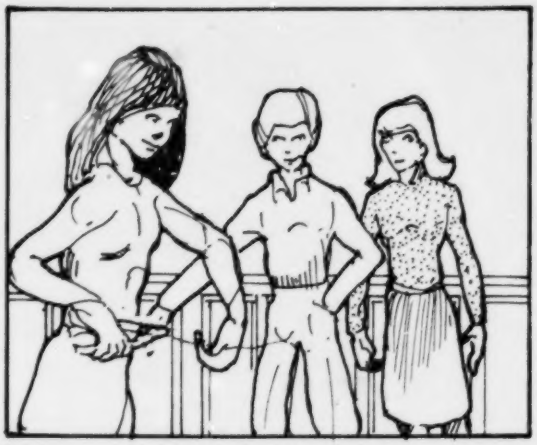
STEP 12 – This black wire is letter C on the wiring diagram.



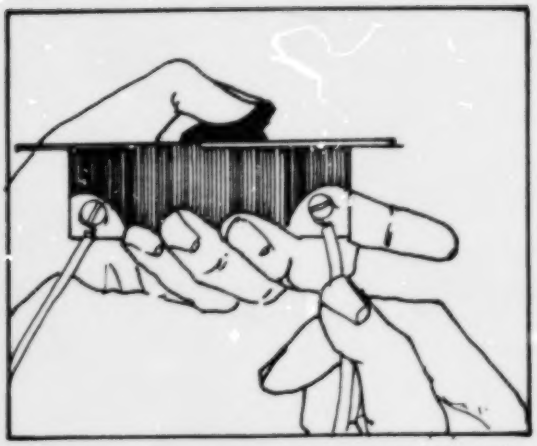
STEP 13 – Slide the black and white wire through the hole in the receptacle box.



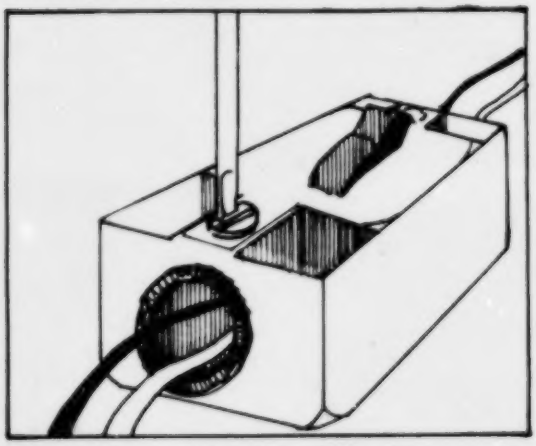
STEP 14 – Be sure the switch is in the off position. Attach the white wire to the screw on the switch. Be sure the wire is in a clockwise direction around the screw.



STEP 15 – Measure, cut and strip a second white wire 30 cm long by following steps 1 – 10. This will be wire B in the diagram.

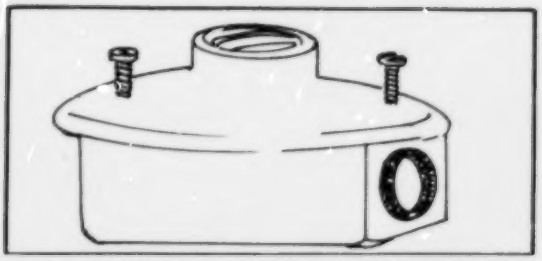


STEP 16 – Attach one end of the white wire (B) to the switch screw. Again, the wire should be connected in a clockwise direction.

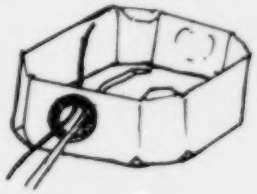


STEP 17 – Push the switch down on the junction box. Using a common screwdriver, attach the switch to the box by tightening both securing screws. Be sure both white wire B and black wire C have been passed through the rear hole in the junction.

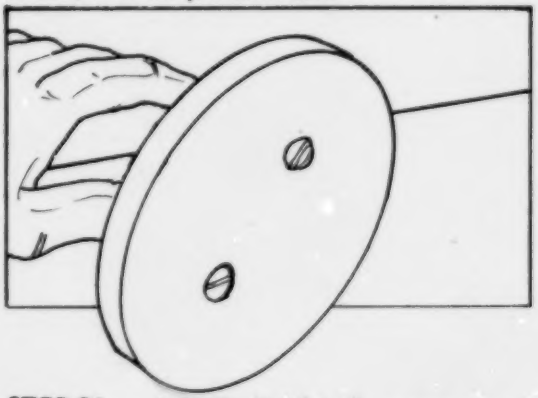
STEP 18 – Using two screws, secure the cover plate over the switch box.



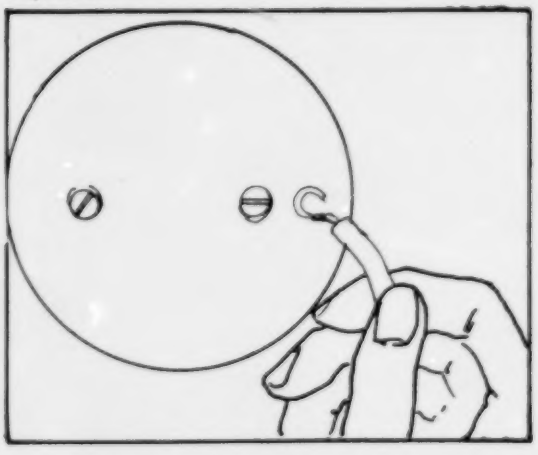
STEP 19 – Unscrew both screws found on the ceramic light bulb receptacle. This will remove the receptacle from the square junction box.



STEP 20 – Slide both wires B (white) and C (black) into the junction box.



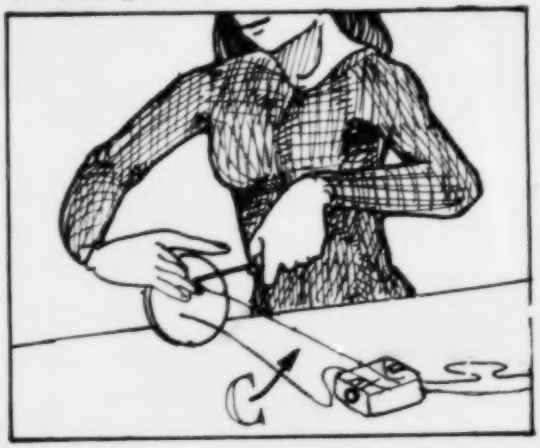
STEP 21 – Lift the light bulb receptacle so that the two screws on the bottom are exposed.



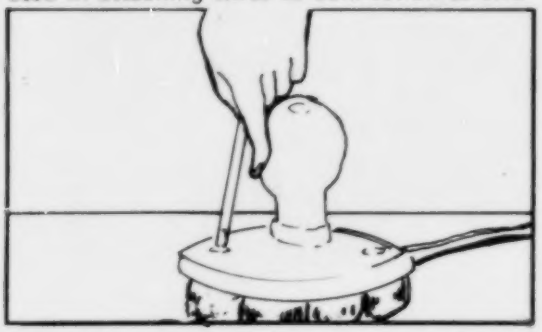
STEP 22 – Attach white wire B to one of the bottom connections of the receptacle.

20

STEP 23 – Follow the directions used in wiring the switch. Be sure none of the bare wires are touching anything but the connecting screws.



STEP 24 – Attach one end of wire C to the base of the light receptacle. Follow the steps used in attaching wires to connection screws.



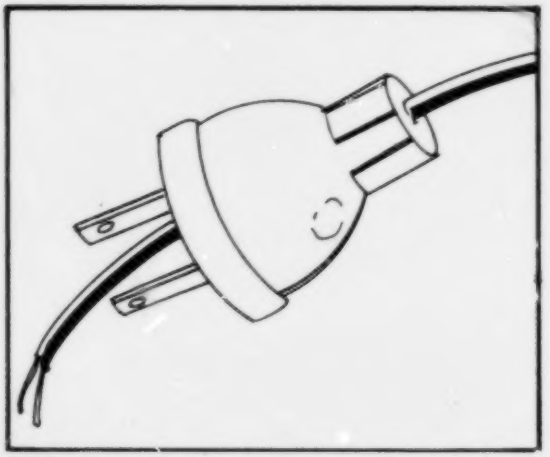
STEP 25 – Using two screws, secure the light bulb to the junction box.

Check Point

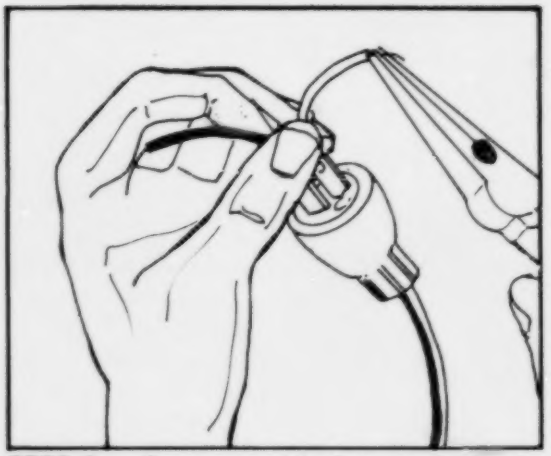
Ask the instructor to inspect the wiring for safety before attempting to plug in or operate this circuit.

Instructional Objective V

Using the needle-nose pliers, screwdriver, plug, and wire, the student will assemble the plug.

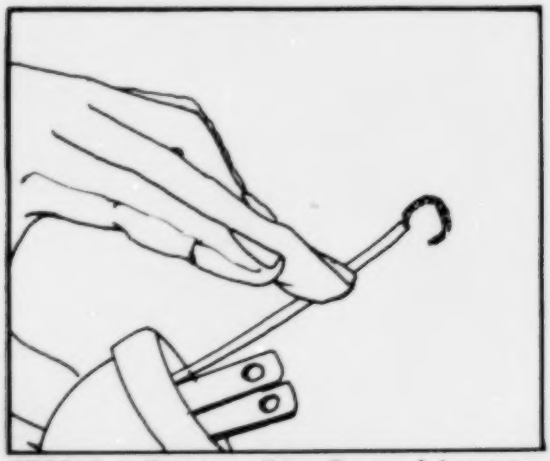


STEP 1 – Slide stripped wires, A and C, through the center of the plug.

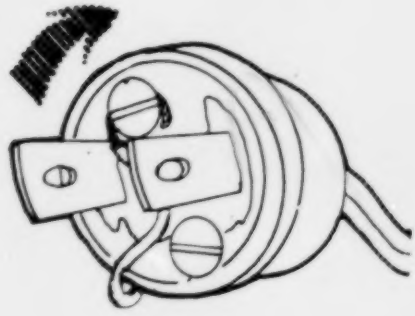


STEP 2 – Grasp one end of exposed wire A with needle-nose pliers.

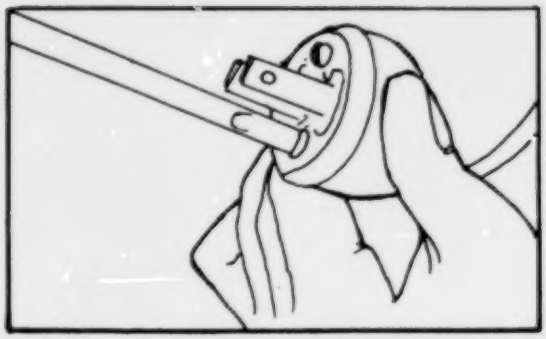
STEP 3 – Twist one turn clockwise so wire will look like a circle.



STEP 4 – Remove pliers. Be careful not to change the shape of the wire.



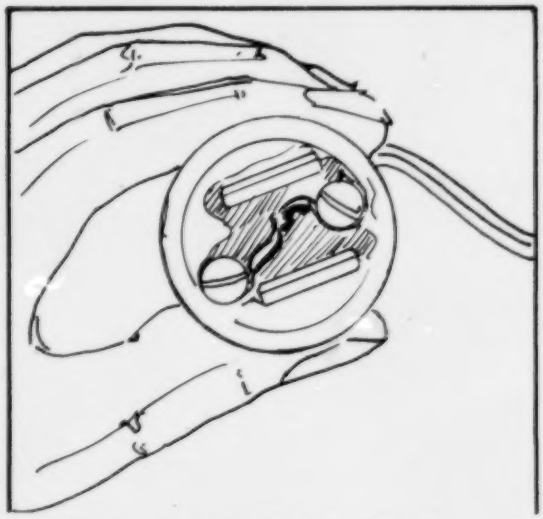
STEP 5 – Place wire under one of the open screws in plug.



STEP 6 – Using a common screwdriver, tighten screw on the wire until snug, turning clockwise.

STEP 7 – Repeat steps 2 through 6 with black wire B for the plug.

Check Point



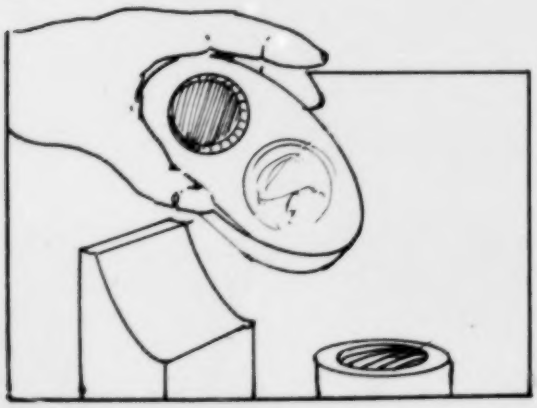
Have your partner inspect your work. Does it look like this picture? If it looks like this, place the plastic plug cover over the plug.

Instructional Objective VI

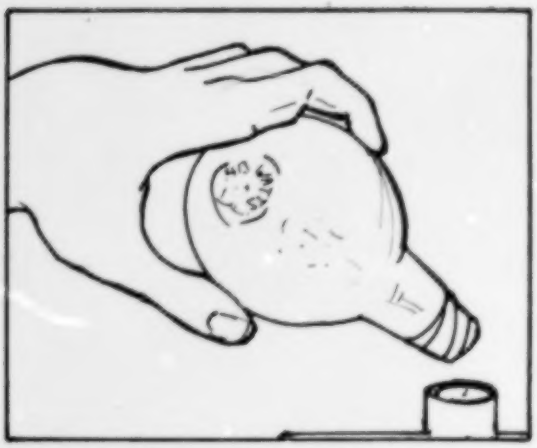
Given appropriate instructions and equipment, the student will prepare the module for the power experiment.

SAFETY NOTE: Always unplug any electrical item when not in use.

STEP 1 – Obtain the light meter from the instructor. Be careful; this is a sensitive and fragile instrument.

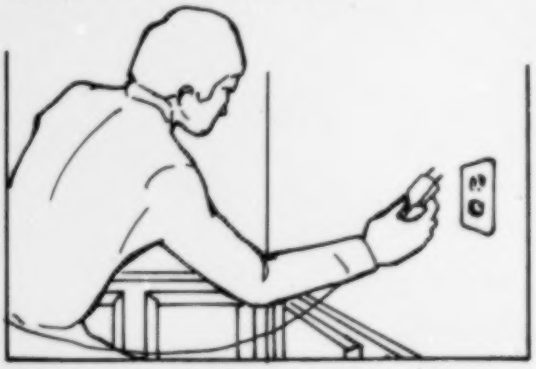


STEP 2 – Place the meter in the meter holder located next to the light bulb receptacle.



STEP 3 – Place a 40-watt light bulb in the procelain receptacle.

STEP 4 – Check the transformer voltage lever; be sure it indicates zero.



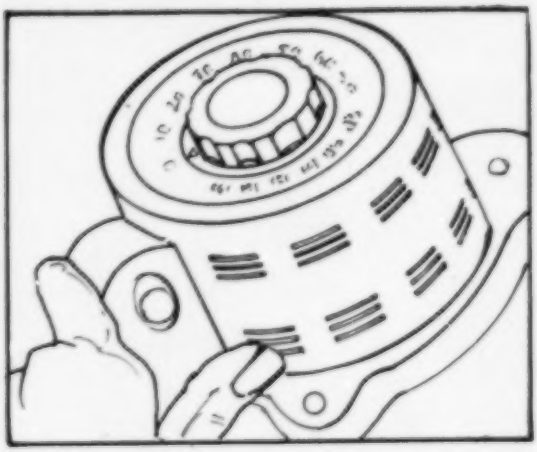
STEP 5 – Plug in the transformer.

Check Point

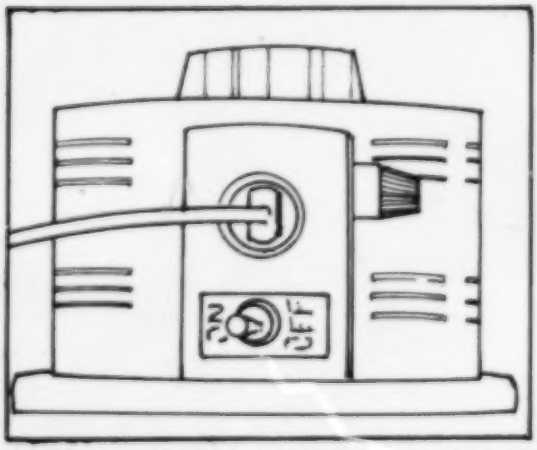
Is the meter facing the light bulb?

Instructional Objective VII

Given appropriate instructions and equipment, the student will record light density readings using various bulbs and voltage to identify effects of and voltage on a current.

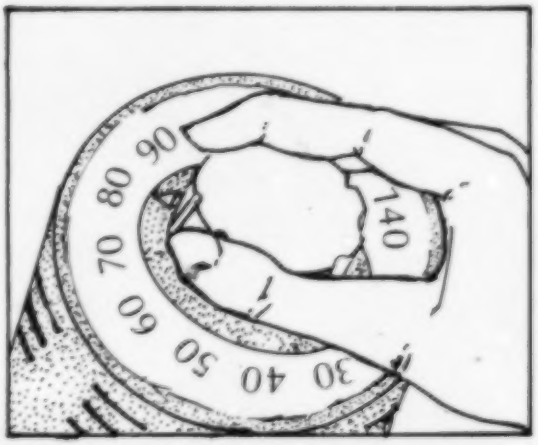


STEP 1 – Insert the plug from the circuit into the transformer receptacle.

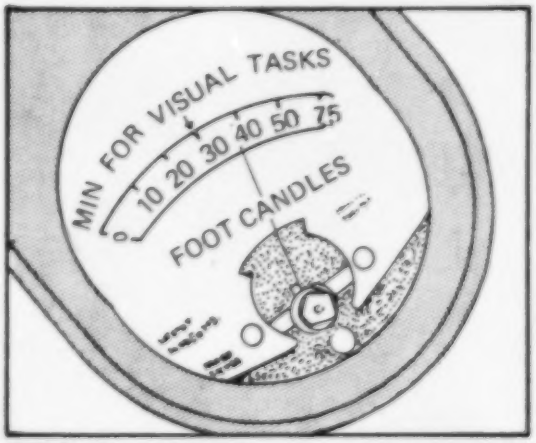


STEP 2 – Adjust the voltage control lever on the transformer to deliver 40 volts to the light bulb. Turn switch to the "on" position.

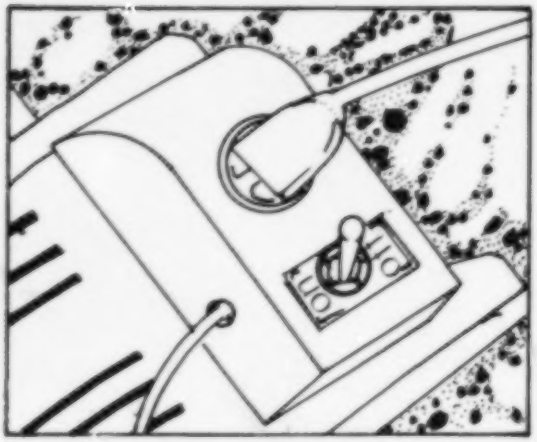
STEP 3 – Observe and record the meter reading on the check sheet. Turn switch to the "off" position.



STEP 4 – Increase the voltage to 80 volts from the transformer. Turn switch to the "on" position.

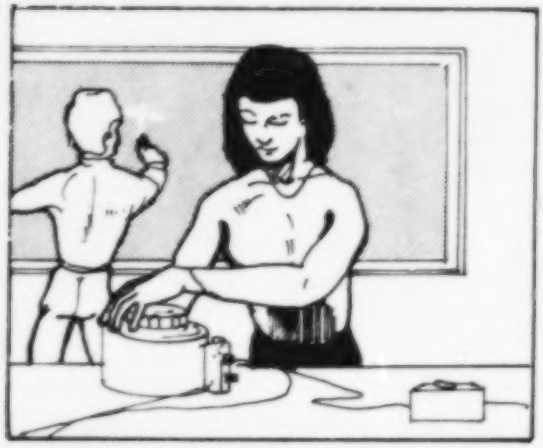


STEP 5 – Observe and record the meter reading on the check sheet. Turn switch to the "off" position.

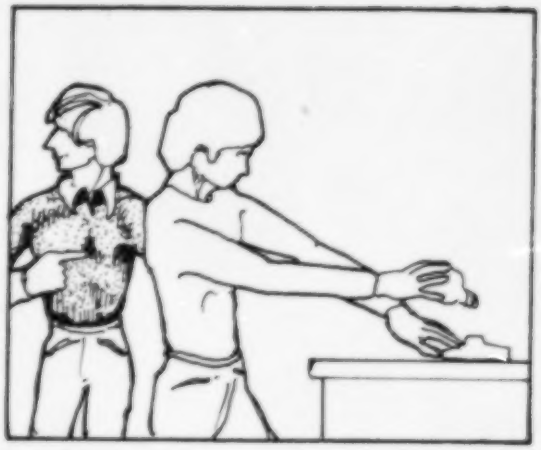


STEP 6 – Increase the voltage to 110 volts from the transformer. Turn switch to the "on" position.

STEP 7 – Observe and record the meter reading on the check sheet. Turn switch to the "off" position.



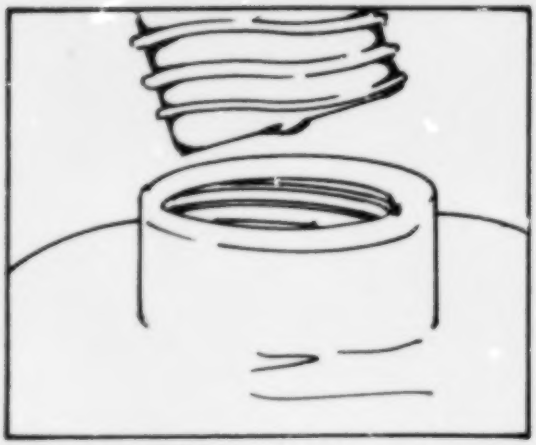
STEP 8 – Return the voltage control lever to the zero position.



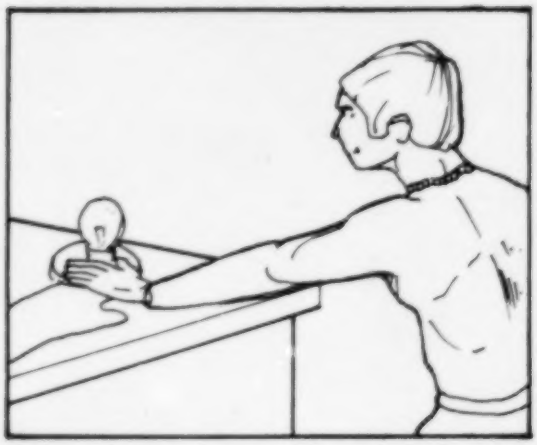
STEP 9 – When the 40-watt bulb has cooled, remove it from the socket.

STEP 10 - Place a 60-watt bulb in the socket. Twenty more watts of power are needed to operate this bulb than the 40-watt bulb.

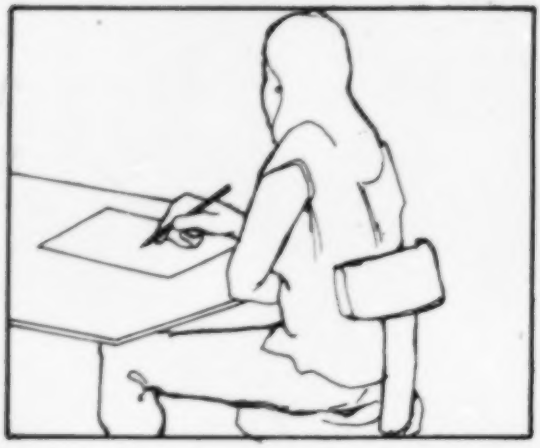
STEP 11 – Follow steps 1 – 7 in adjusting the voltage delivered to the 60-watt bulb. Record the finding on the check sheet chart below the 40-watt readings.



STEP 12 – When the 60-watt bulb has cooled, remove it from the socket.



STEP 13 – Place a 100-watt bulb in the socket. This bulb requires 40 more watts of power to operate than does the 60-watt bulb.



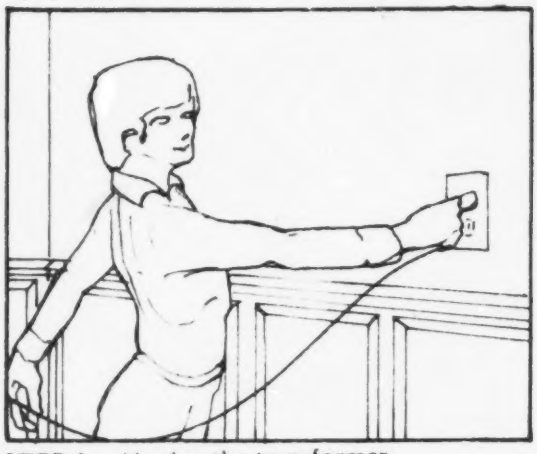
STEP 14 – Follow steps 1 – 7 in adjusting the voltage delivered to the 100-watt bulb. Record the findings on the check sheet chart below the 60-watt readings.

Check Point

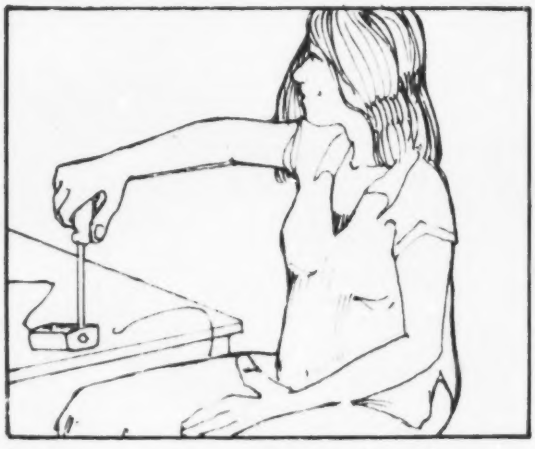
Be sure you have filled in all the spaces on the check sheet chart.

Instructional Objective VIII

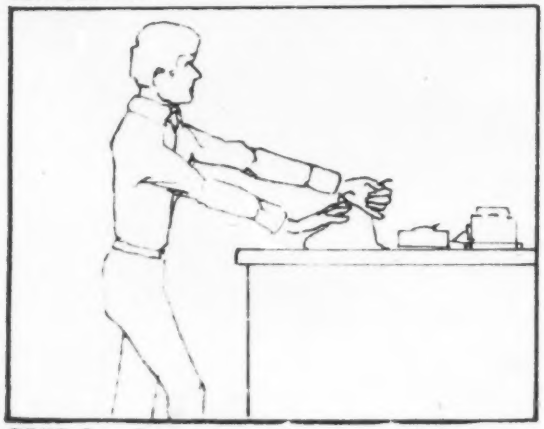
Given appropriate instructions, the student will clean up and return all tools and equipment.



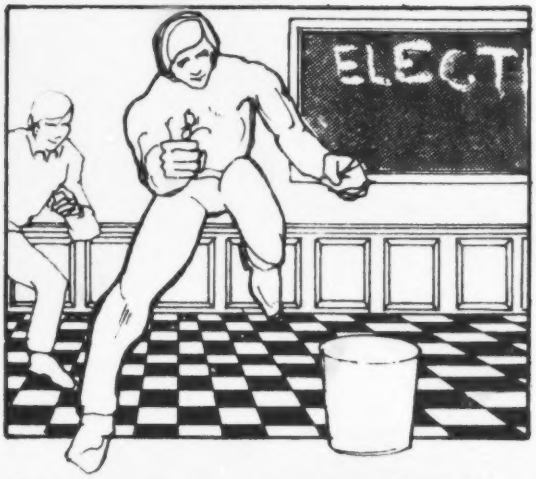
STEP 1 – Unplug the transformer.



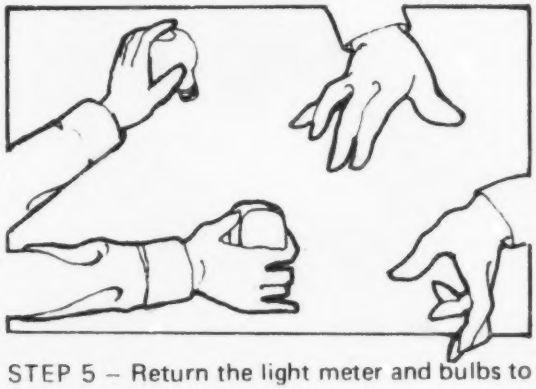
STEP 2 – Disconnect all wires from the screw connections.



STEP 3 – Disconnect Wires A and C from the plug.



STEP 4 – Clean up all pieces of insulation around the work area.



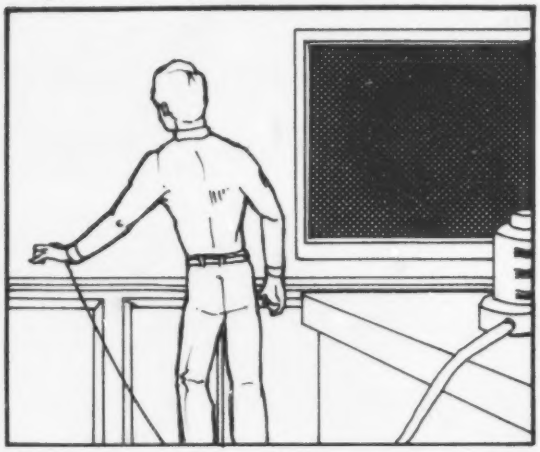
STEP 5 – Return the light meter and bulbs to the instructor.

Check Point

Have the instructor inspect the module for neatness in the clean-up activity.

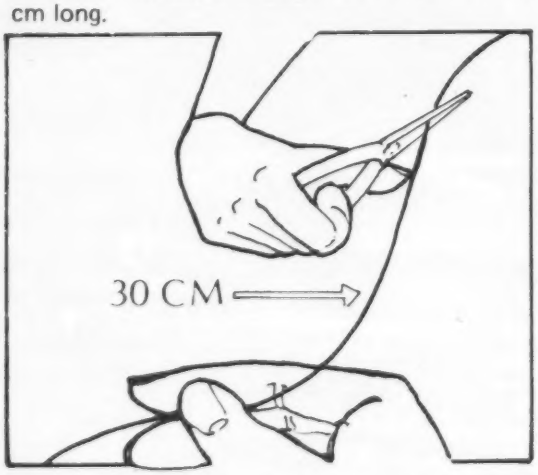
Instructional Objective IX

Given appropriate equipment and using diagram B, the student will wire the circuit.

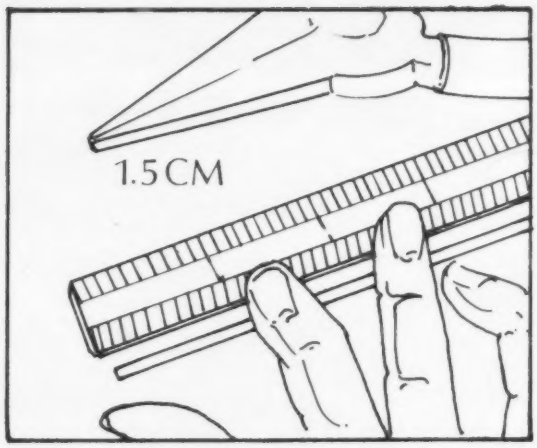


SAFETY NOTE: Always unplug any electrical item when not in use.

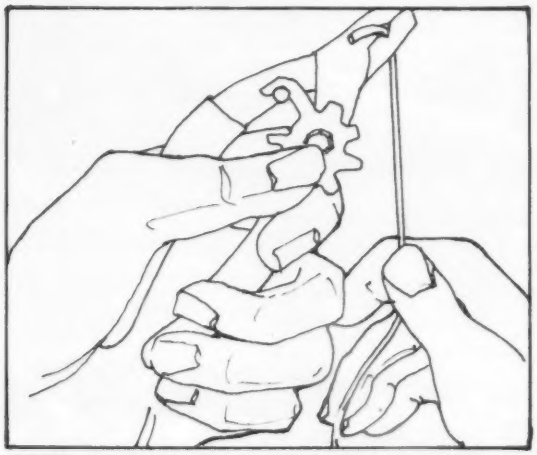
STEP 1 – Measure a length of white wire 30 cm long.



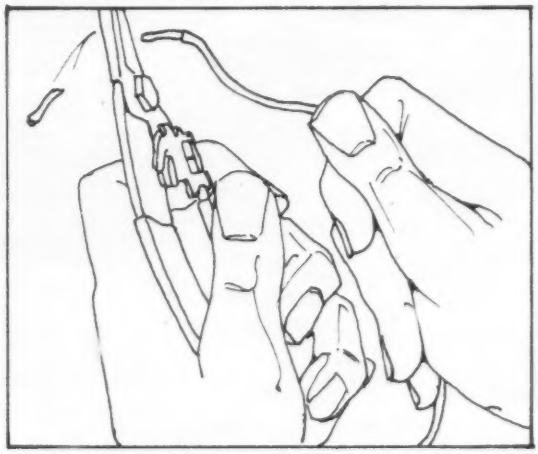
STEP 2 – Using the needle-nose pliers, cut off this length of white wire.



STEP 3 – Measure 1.5 cm on each end of the wire.



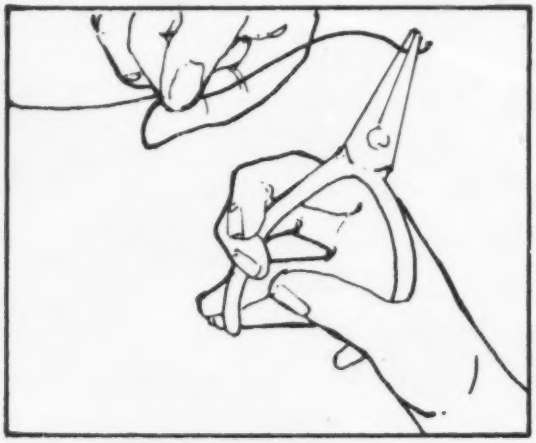
STEP 4 – Using the wire strippers, adjust the hole number setting to 12, grasp the insulation on the 1.5 cm mark.



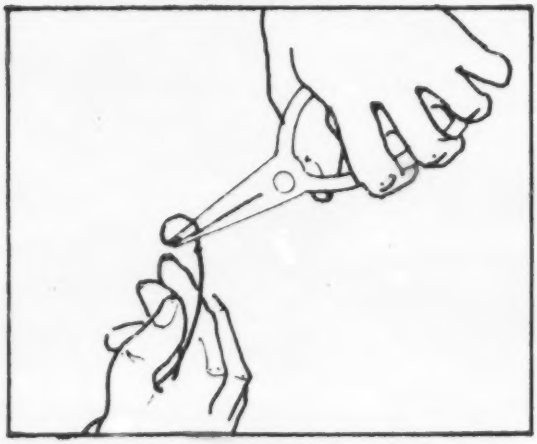
STEP 5 – Squeeze and pull off 1.5 cm of insulation.

REPEAT

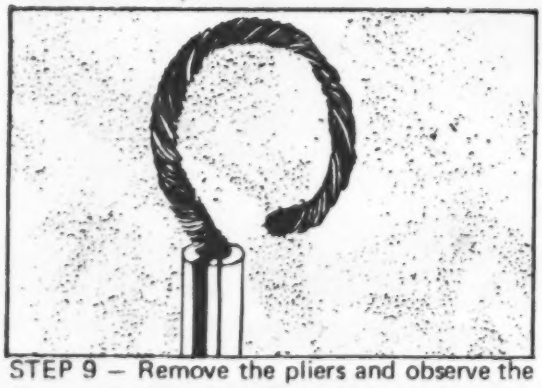
STEP 6 – Repeat this operation for the other end of the wire.



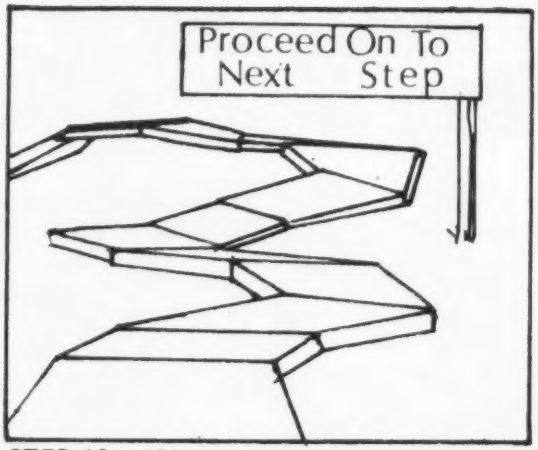
STEP 7 – Using the needle-nose pliers, grasp the end of the exposed wire.



STEP 8 – Twist the wire into a circle around the end of the pliers.



STEP 9 – Remove the pliers and observe the shape of the wire. Does it look like the illustration above?

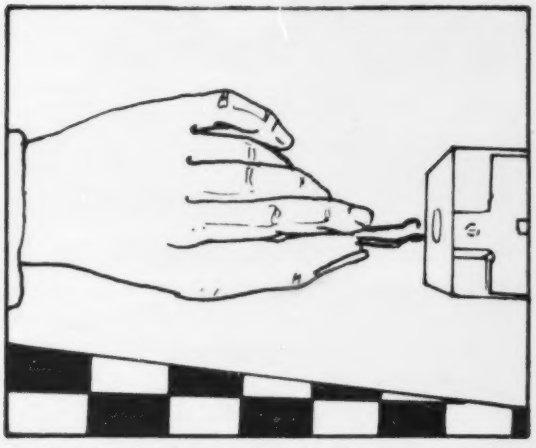


STEP 10 – If it does resemble step 9, proceed with steps 7, 8, and 9 for the other end of the wire.

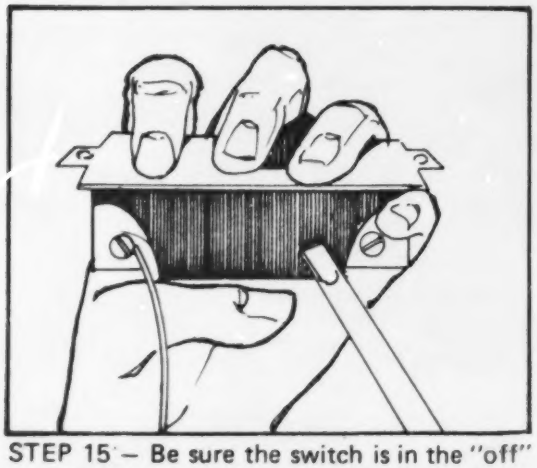
STEP 11 – This is wire A on the diagram.

STEP 12 – Measure, mark, cut and strip a piece of black wire 70 cm long. Follow steps 1–10 for the proper procedure.

STEP 13 – This black wire is letter C on the wiring diagram.



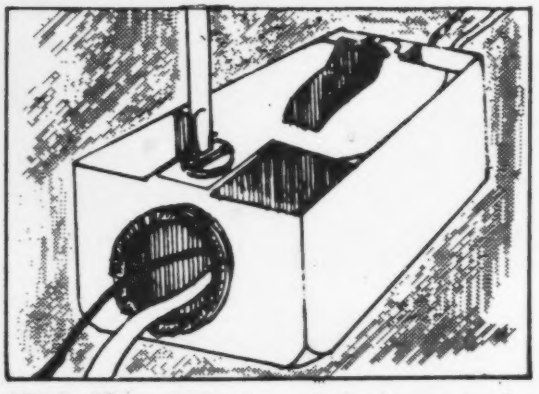
STEP 14 – Slide the black (C) and white (A) wires through the hole in the receptacle box.



STEP 15 – Be sure the switch is in the "off" position. Attach the white wire (A) to the screw on the switch. Be sure the wire is in a clockwise direction around the screw.

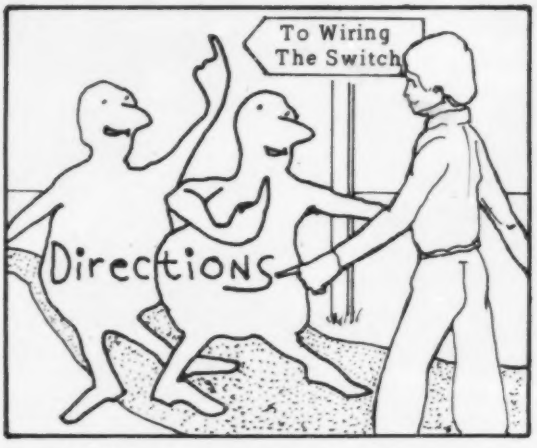
STEP 16 Measure, cut and strip a second white wire 30 cm long by following steps 1 – 10. This will be wire B in the diagram.

STEP 17 – Attach one end of the white wire (B) to the switch screw. Again, the wire should be connected in a clockwise direction.

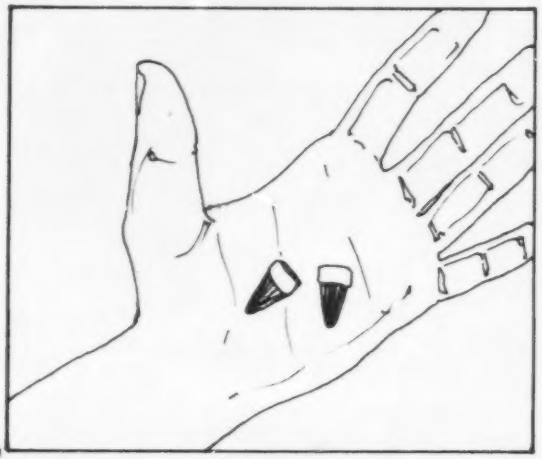


STEP 18 – Push the switch down on the junction box. Using a common screwdriver attach the switch to the box by tightening both securing screws. Be sure both wires black (C) and white (B) have been pulled through the open rear hole in the junction box.

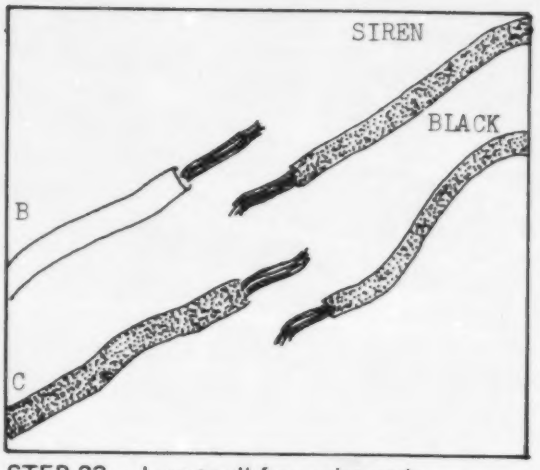
STEP 19 – Using two screws, secure the cover plate over the switch box.



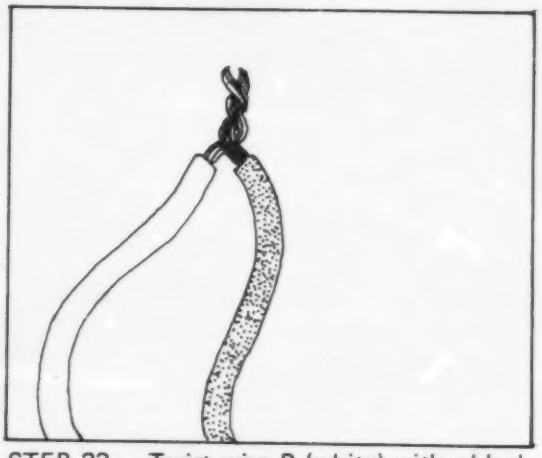
STEP 20 – Follow the directions used in wiring the switch. Be sure none of the bare wires are touching anything but the connecting screws.



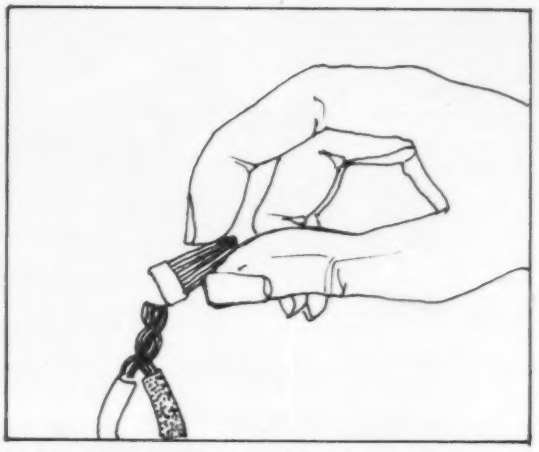
STEP 21 – To properly connect the black (C) and white (B) wires to the siren wires you must locate two screw nut connectors.



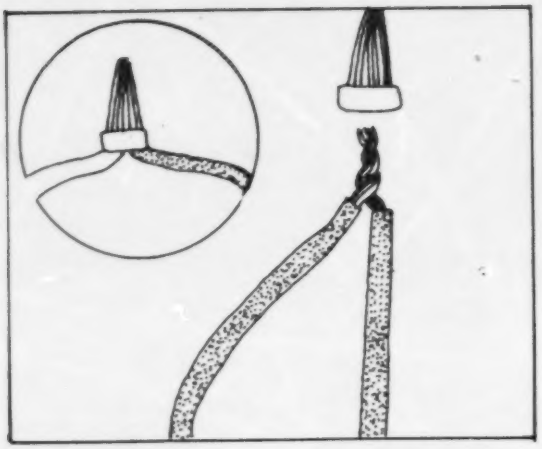
STEP 22 – Locate all four wire ends.



STEP 23 – Twist wire B (white) with a black siren wire so both wires appear to be crossed over each other.



STEP 24 – After the wires have been cross-tied together, screw the nut connection over these wires. Check for a tight fit.



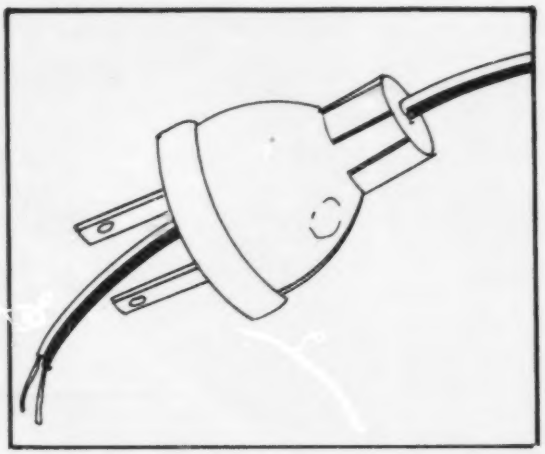
STEP 25 – Repeat this operation (Steps 23, 24) for wire C (black) and the other black siren wire.

Check Point

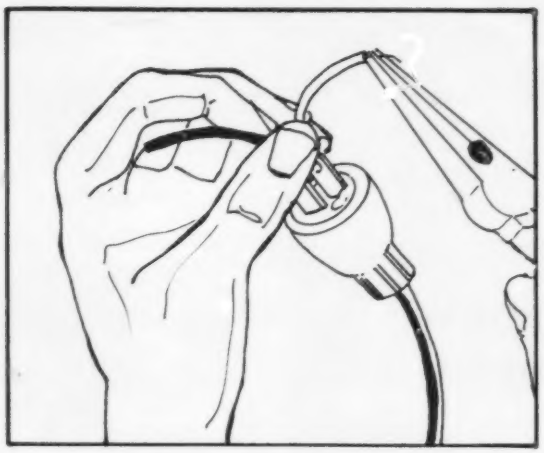
Ask the instructor to inspect the wiring for safety before attempting to plug in or operate this circuit.

Instructional Objective X

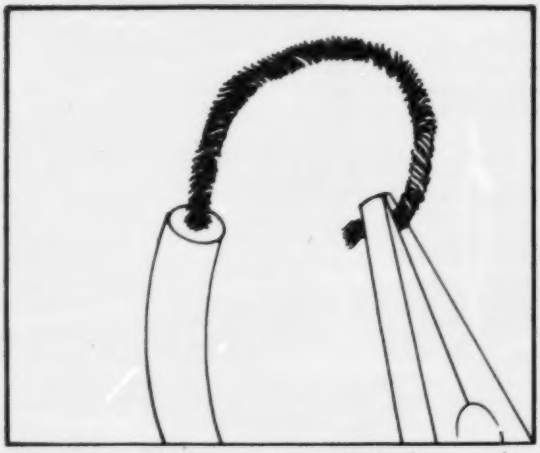
Using the needle-nose pliers, screwdriver, plug, and wire, the student will assemble the plug.



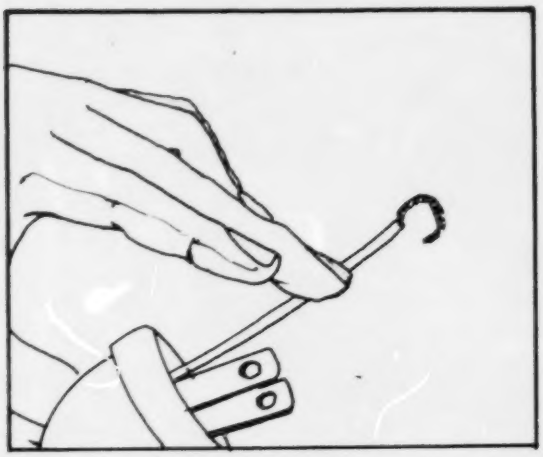
STEP 1 – Slide stripped wires A (white) and C (black) through the center of the plug.



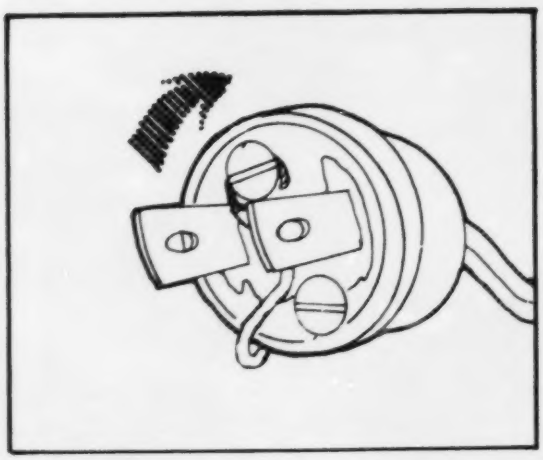
STEP 2 – Grasp one end of exposed wire A (white) with needle-nose pliers.



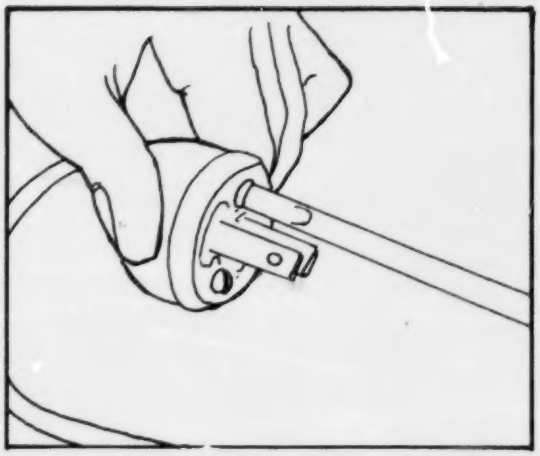
STEP 3 – Twist one turn clockwise so wire will look like a circle.



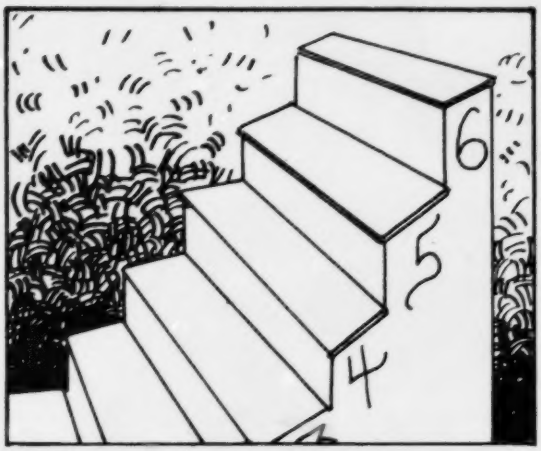
STEP 4 – Remove pliers. Be careful not to change the shape of the wire.



STEP 5 – Place wire under one of the open screws in plug.



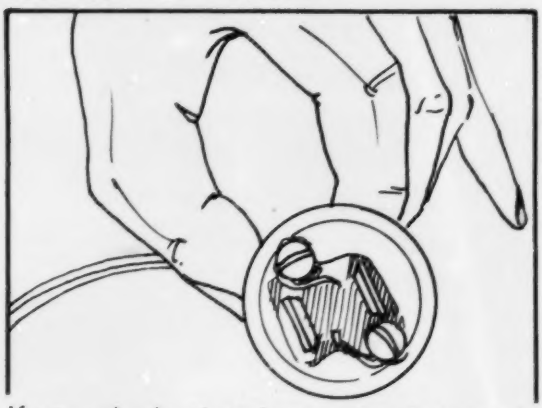
STEP 6 – Using a common screwdriver, tighten screw on the wire until snug, turning clockwise.



STEP 7 – Repeat steps 2 through 6 with wire C (black) for the plug.

Check Point

Have your partner inspect your work. Does it look like this picture?



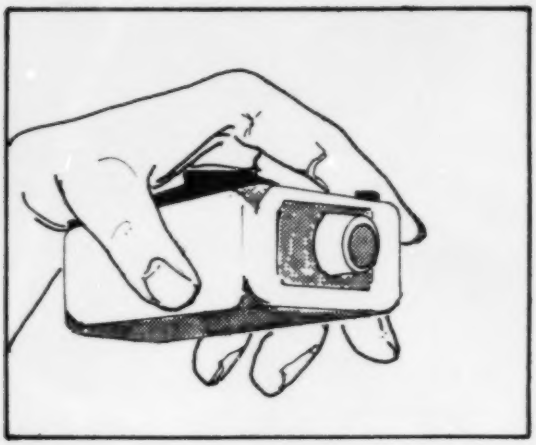
If your plug has been inspected and accepted, place the cover over the plug prongs.

SAFETY NOTE: Always unplug any electrical item when not in use.

Instructional Objective XI

Given appropriate instructions and equipment, the student will prepare the mock-up for the power experiment.

STEP 1 – Ask the instructor for the sound meter. This is a fragile and accurate measurement device which requires extra care in handling.



STEP 2 – Locate the place on the mock-up where the sound meter is placed for operation. Set the meter in the proper place.

Check Point

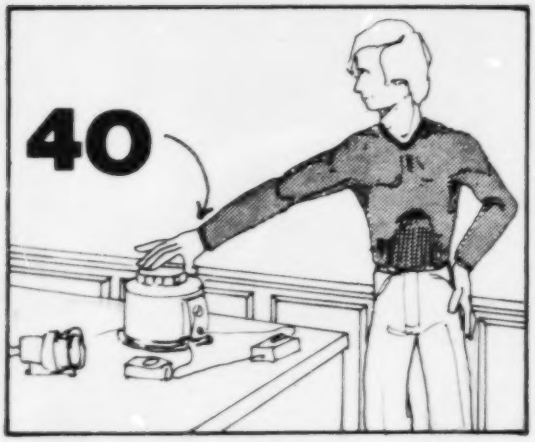
Is the meter correctly in place next to the siren?

34

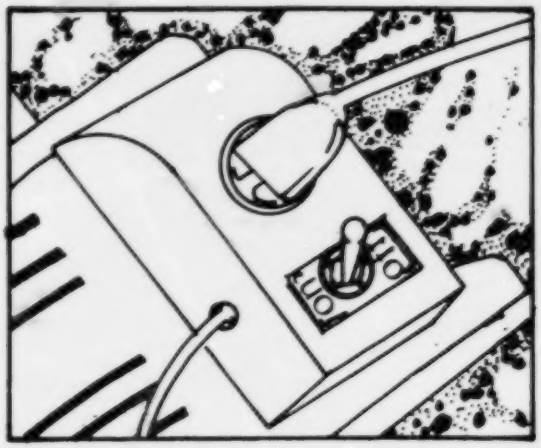
Instructional Objective XII

Given appropriate instructions and equipment, the student will operate the siren and record the decibel levels at various voltages.

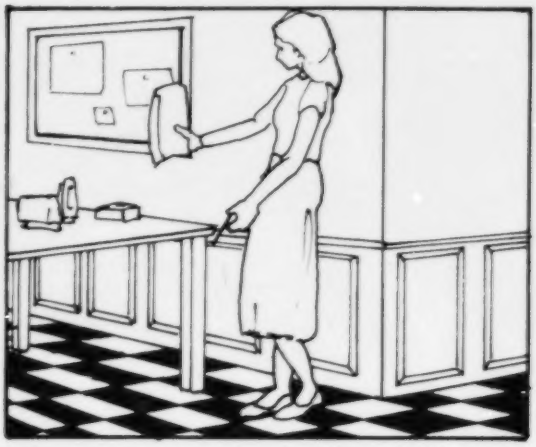
STEP 1 – Insert plug into transformer.



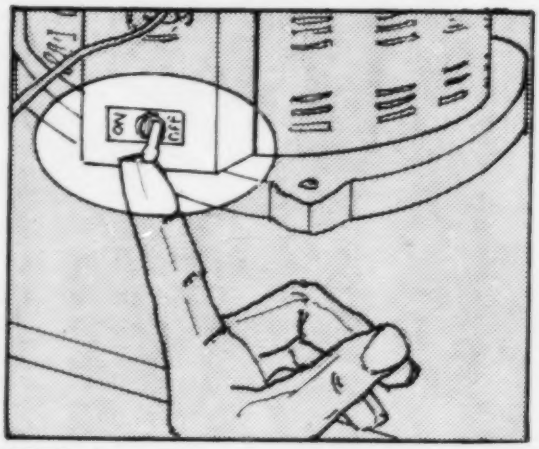
STEP 2 – Adjust the voltage control lever to the 40 voltage reading.



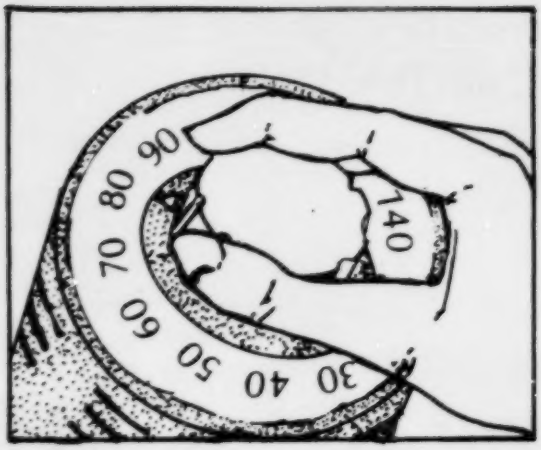
STEP 3 – Turn the switch to the "on" position.



STEP 4 – Observe and record the decible level on the check sheet chart.

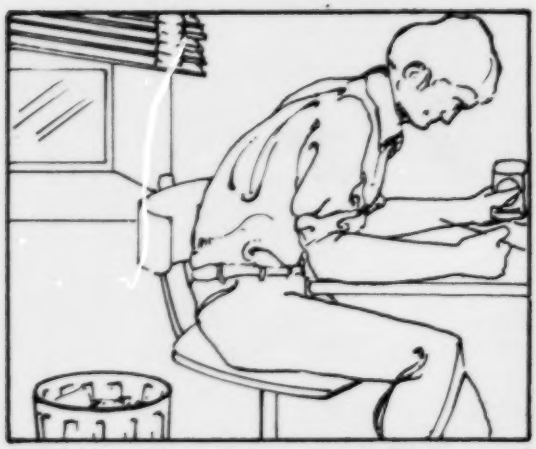


STEP 5 – Turn the switch to the "off" position.

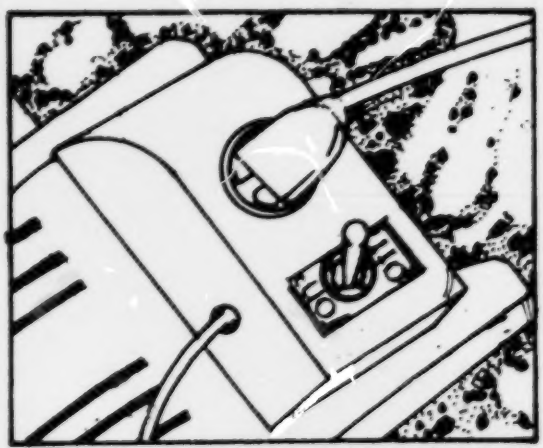


STEP 6 – Adjust the voltage control level to the 80 voltage reading.

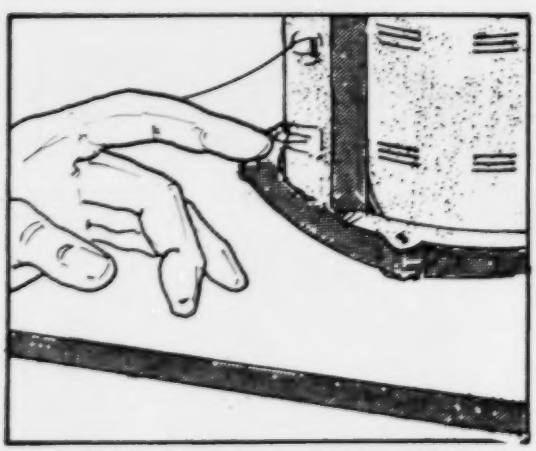
STEP 9 – Adjust the voltage control lever to the 110 voltage reading.



STEP 7 – Turn switch "on." Observe and record the decibel level on the check sheet chart.

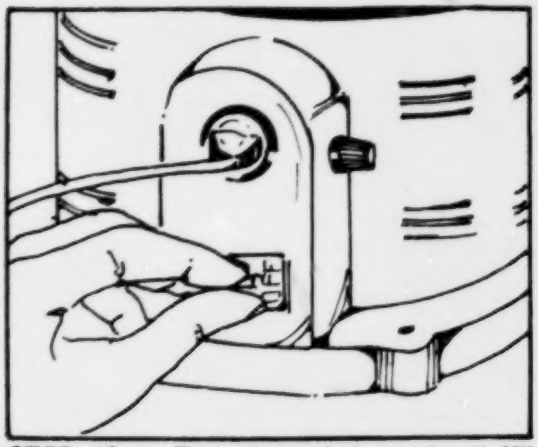


STEP 10 – Turn the switch to the "on" position.



STEP 8 – Turn the switch to the "off" position.

STEP 11 – Observe and record the decibel level on the check sheet chart.



STEP 12 – Turn the switch to the "off" position.

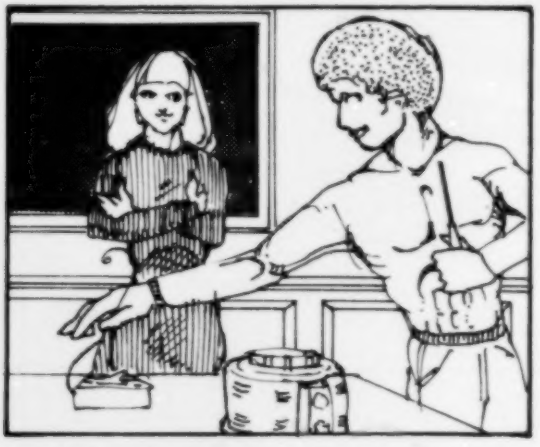
Check Point

Have all the blank spaces on the check sheet been filled?

Instructional Objective XIII

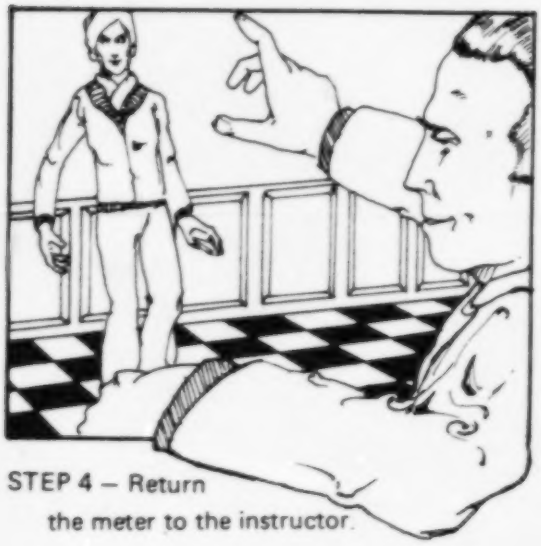
Given appropriate instructions, the student will clean up and return all tools and equipment.

STEP 1 – Unplug the transformer.



STEP 2 – Disconnect all wires from the screw connections.

STEP 3 – Clean up all pieces of insulation around the work area.



STEP 4 – Return the meter to the instructor.

Check Point

Have the instructor inspect the module for neatness in the clean-up activity.

829.131-014 ELECTRICIAN SUPERVISOR (any ind.)

Supervises and coordinates activities of ELECTRICAL REPAIRER (any ind.) and ELECTRICIAN (any ind.) engaged in construction, maintenance, and repair of electric power, lighting, and communication systems of buildings, factories, and transportation equipment: Plans wiring and installation of equipment and fixtures, such as motors, generators, switches, circuit breakers, and fuse boxes, according to blueprints, schematic drawings, and sketches. Inspects wiring and fixtures for conformance to company specifications or local electrical codes, using test equipment, such as voltmeter and ohmmeter. Performs other duties as described under SUPERVISOR (any ind.). May supervise workers engaged in maintenance of electrical systems and be designated BUILDING-MAINTENANCE SUPERVISOR, ELECTRICAL (any ind.); ELECTRICIAN SUPERVISOR, MAINTENANCE (any ind.). May supervise workers specializing in electrical systems of transportation equipment and be designated ELECTRICIAN SUPERVISOR, AIRPLANE (air trans.); ELECTRICIAN SUPERVISOR, AUTOMOTIVE (auto. ser.); ELECTRICIAN SUPERVISOR, LOCOMOTIVE (loco. & car bldg. & rep.). May be designated according to workers supervised as CIRCUIT-BREAKER SUPERVISOR (light, heat, & power); POWER-TRANSFORMER-REPAIR SUPERVISOR (light, heat, & power); SERVICE-TRANSFORMER-REPAIR SUPERVISOR (light, heat, & power).

829.684-022 ELECTRICIAN HELPER (any ind.) wirer helper.

Assists ELECTRICIAN (any ind.) to install and repair electrical wiring, fixtures, and equipment, performing any combination of following tasks: Measures, cuts, and bends wire and conduit, using ruler and handtools. Drills holes for wiring, using power drill, and pulls or pushes wiring through opening. Assists in lifting, positioning, and fastening objects, such as wiring, conduit, and motors. Performs minor repairs, such as replacing fuses, light sockets, bulbs, and switches, using handtools. Maintains tools and equipment and keeps supplies and parts in order. Disassembles defective electrical equipment, such as motors, using handtools. Performs other duties as described under HELPER (any ind.).